RMRC
Bhubaneswar

Annual Report
2002-03

Regional Medical Research Centre
Bhubaneswar

Annual Report
2002-03

Regional Medical Research Centre

(Indian Council of Medical Research)

Bhubaneswar - 751023

Orissa, India

Contents

PREFACE

Regional Medical Research Centre continued its research activities in priority areas of diseases prevalent in this region like filariasis, malaria, nutrition disorder and haemoglobinopathy. Besides research activities, other pertinent areas like human resource development, dissemination of scientific information, providing consultancy services towards disease diagnosis and control and infrastructure strengthening were emphasized during the year.

Research activities addressed on basic, applied and operational areas intending to develop diagnostic or morbidity marker of infection, or knowledge towards better understanding of disease or strategy that can find useful field application. During the year, thirty research projects were in operation (18 extramural and 12 intramural) of which 7 have been completed and 23 projects are continuing (13 extramural and 10 intramural). Four new projects were initiated this year.

Lymphatic filariasis has been the major focus of research of this Centre. Several antigenic molecules with potential of being diagnostic or morbidity marker in filarial infection are characterized. Studies on host immune responses in natural infection of filarial disease will help in understanding natural protection and provide crucial information on regulatory mechanism involved in disease spectrum. For morbidity management of chronic filarial disease, clinical trials with inexpensive and community acceptable regimens are undertaken that show encouraging results. Evaluation of advocacy package and feasibility of mass drug administration (MDA) have been addressed that can help in developing package for elimination of lymphatic filariasis.

Malaria is highly endemic in Orissa & bordering States that contributes to high morbidity and mortality in country. Research is addressed in areas of situational analysis of malaria, to assess risk factors, estimation of disease burden and health seeking behaviour and practices that can help developing suitable package of intervention by community participation. To boost existing molecular epidemiological studies addressed to parasite diversity in malaria, and G-6PD deficiency disorders indicated geographical distribution pattern, and clinical significance are being studied. Risk factors leading to under nutrition in elderly primitive tribes are addressed with attempt to develop suitable community intervention module. Studies undertaken in tribal population identified their morbidity pattern and incriminating factors that can help in developing a good data base and developing suitable intervention package.

Efforts have been made for training, networking and infrastructure strengthening to assist research activities, strategy development and surveillance activities. Interaction with State Health Department was strengthened in form of consultancy in various areas like evaluation of programme, situation assessment and monitoring programme activities. The out-breaks of diarrhoea, malaria and other diseases are being investigated.

For dissemination of scientific information, 6 monthly News Bulletins are published by this Centre. The pamphlets and booklets incorporating the educative informations on diseases of public health importance are published in local language and used for demonstration and exhibition to public.

The library provides off-line database search facilities with MEDLINE, CD ROM and on-line search through net on research. Inter library loan facility was extended to other libraries at regional level for networking. Other existing facilities of Centre like animal facility, insectorium, Central Lab. and OPD were updated.

During the year, scientists of this Centre have also provided services in various fields. During diarrhoeal outbreaks and Swasth Mela organized by State Health Department and others, diagnostic services have been provided in diarrhoea disorder, haemoglobinopathy, malaria and IDD.

The Centre has made all out efforts to encourage scientists and staff in pursuing their effort. The scientists have made 16 publications during the year of which three are in press. As per scientometric analysis by ICMR for scientific publications in the year 2001, this Center with average impact factor of 3.845 got 3rd position. The average impact factor of publications in impact focton journals for the calender year 2002 is 4.06 showing increasing trend.

Besides publications, the scientists had spent considerable time in attending symposia, meetings, conferences and other training activities. They participated in various committees of this Centre and monthly Staff Council Meetings to help the administrative activities. They actively participate in weekly journal clubs and seminars and impart training to various University Students and other researchers.

Human Resource Development activity of the Centre focused on imparting Ph.D. programme for SRFs and several staff of the Centre, M.Sc. dissertation work for University sponsored students and summer course for students from various Universities of the Country. Besides, scientists have also imparted teaching to University students attending various advanced courses on modern biology. Several medical and para-medical staff referred from various organizations were trained on Lab. diagnesis of diseases like malaria, haemoglobinopathy and filariasis.

The Centre organized National Conferences, Symposia and invited lectures during the year. Besides, ICMR and institutes foundation day, science day National Technology Day cerebrations were conducted.

There are 98 regular staff in position that included 15 scientists with various expertise who catered to accomplish the output.

During the year, 2002-03 Council provided annual budget of Rs.422.34 lakhs. An additional amount of Rs.63 lakhs was generated by the Centre from extramural research grant received from national and international sources.

Infrastructure strengthening was made by procuring scientific equipments and establishing additional facility of IDD laboratory at the Centre in collaboration with NIN, Hyderabad. The Centre undertook one time repair activity of building of staff quarters and through CPWD, the construction of new animal facility and auditorium has been started.

The scientist and staff of the Centre made continuous efforts and contributed significant output of Centre. I sincerely thank them for their endeavour and contributions. I am also thankful to the State Health Department and other agencies and collaborating institutes for their assistance and co-operation. I extend my deep gratitude to Council for their continuous support, guidance and encouragement. With all round support, the Centre can continue its endeavour to achieve its goals.

Dr. S. K. Kar
Director

The Centers' major thrust on Filariasis was sustained this year. Issues on Immunity, pathogenesis of the disease and clinical and anthropological aspects were addressed. With a view to identify markers of morbidity, several pro- as well as anti-inflammatory molecules in circulation were monitored. IL-6 and IL-8 were consistently raised in acute filariasis cases in comparison to patients with chronic disease. More crucially, TNF-a receptor 55 (TNFR-55) was found to be significantly elevated in infected subjects (both in microfilaraemic and in subjects with Cryptic infections) and in patients with Lymphedema/elephantiasis as compared to other clinical categories. On the other hand, patients with acute disease and Hydrocele were found to have elevated levels of TNF-a receptor 75 (TNFR-75) in comparison to other clinical categories. Since TNFR- 55 and TNFR-75 possess clearly defined biological functions, the findings of this study is expected to offer insights into progression of the two diverse clinical presentations viz., elephantiasis and Hydrocele in human filariasis. Protective immunity in human filariasis was addressed by studying immune response to recombinant filarial proteins. Antibodies to Abundant Larval Transcript (ALT-1), a predominant antigen synthesized by infective larvae of filarial parasite, was found to be a protective moiety since there was an age dependant increase in their levels in the endemic population and the IgG antibody levels were significantly more in subjects with no demonstrable filarial infection in comparison to the infected cohorts. More interestingly, IgA antibodies to ALT-1 was found to be significantly more in subjects with cryptic infection as compared to Mf carriers indicating their role in anti-microfilarial immunity. Longitudinal follow-up of cohorts of Mf carriers and Endemic normals (conducted over 13-18 years) have offered new insights on the Natural history of human filariasis, most crucially that patent infections with microfilaraemia is not a pre-requisite for development of chronic filarial disease and that asymptomatic and amicrofilaraemic subjects are equally at risk of developing disease.

Molecular analysis of MSP1 and MSP2 genes were undertaken in 72 isolates (53 from non-complicated cases and 19 from patients with severe complications) of *P.falciparum* malaria. The results revealed that multiplicity of strains was more common in clinically complicated cases in comparison to non-complicated cases of malaria. Glucose-6-phosphate dehydrogenase (G6PD) deficiency is common in malaria endemic areas of the world and so far 90 molecular variants of G6PD genes have been identified. Eight different tribes of Orissa were studied for typing the G6PD genes and all the tribes were found to widely possess G6PD Orissa mutation.

Studies on diarrhoel diseases conducted in primitive tribes have revealed Cholera accounting for 3.2 % of culture positive cases followed by *Shigella* spp (2.2%) and Salmonella spp contributing to 0.3%. Molecular analysis of selected *V.cholerae* isolates revealed the presence of ctx A and rfb genes as shown by multiplex PCR.

STAFF POSITION AS ON 31.03.2003

DIRECTOR

DR.S.K. KAR, MD

IMMUNOLOGY DIVISION

Dr.M.K.Das, M.Sc., Ph.D.	Deputy Director (Sr. Gr.)
Dr.B.Ravindran, M.Sc., Ph.D.	Deputy Director (Sr. Gr.)
Dr.M.K.Beuria, M.Sc., Ph.D.	Senior Research Officer
Dr.A.K.Satapathy, M.Sc., Ph.D.	Senior Research Officer
Mr.N.Mandal, M.Sc., M.Phil., B.Ed.	Research Assistant
Dr.P.K.Sahoo, M.Sc., Ph.D.	Research Assistant
Dr..M.C.Mohanty, M.Sc., M.Phil.,Ph.D.	Research Assistant
Dr.(Mrs.)M.S.Bal,M.Sc.,M.Phil., Ph.D.	Research Assistant
Mr.H.S.Naik, Dip. MLT	Lab. Technician
Mr.K.C.Parichha	Insect Collector
Mr. S.C. Das	Lab. Attendant

PATHOLOGY AND MICROBIOLOGY DIVISION

Dr.G.P.Chhotray, M.D.	Deputy Director
Dr.M.R.Ranjit, M.Sc., Ph.D.	Senior Research Officer
Dr. B.B. Pal, M.Sc., Ph.D.	Senior Research Officer
Mr.B.Murmu, M.Sc., M.Phil.	Research Assistant
Mr.H.K.Khuntia, M.Sc.	Research Assistant
Mr.B.N.Sethi, Dip. MLT	Lab. Technician
Mr.K.C.Dalai, B.A., ITI	Lab. Assistant
Mr.B.K.Kanhar	Lab. Assistant
Mr.C.R.Samantray	Lab. Assistant
Mr.K.C.Jena	Laboratory Attendant
Mr. S. K. Mallick	Lab. Attendant

CLINICAL, EPIDEMIOLOGY AND STATISTICS DIVISION

Dr.S.S.S. Mohapatra, M.B. B.S.	Assistant Director
Dr.B.V.Babu, M.A., Ph.D., PGDAS	Assistant Director
Dr.A.Mohapatra, M.Sc., M.Phil., Ph.D.	Senior Research Officer
Dr.(Mrs.) A.S.Kerketta, M.B. B.S.	Research Officer
Mr.P.K.Jangid, M.Sc.	Statistical Assistant
Dr.A.S.Acharya, M.Sc., M.Phil, LL.B. Ph.D.	Research Assistant
Mr.D.P.Hansdah, M.Sc.	Research Assistant
Mr.S.C.Rout	Lab. Technician
Mr. T. Moharana	Lab. Assistant
Mr.R.N.Nayak, B.A.	Census Taker
Mr. K. Dhal, B.A.	Census Taker
Mr.N.N.Pattnaik	Laboratory Attendant
Mr.H.K.Jena	Field Attendant
Mr.R.K.Hembram	Field Attendant

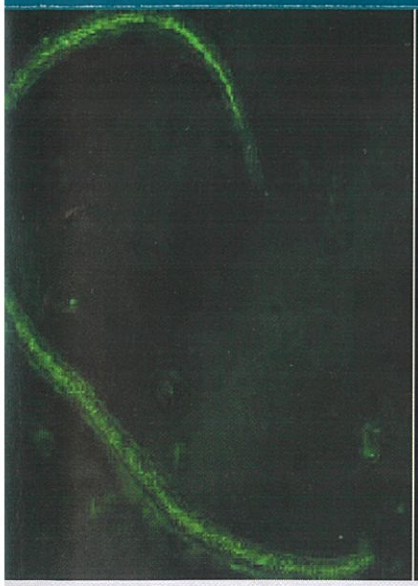
Staff position as on 31.03.2003

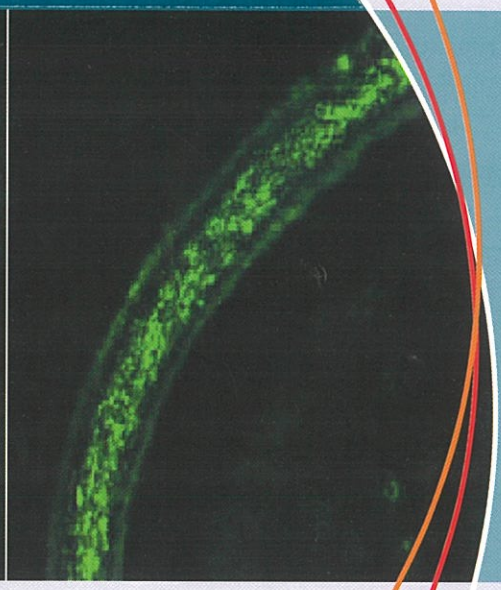
Dr.(Mrs.)N.Mohapatra, M.Sc., Ph.D.	Assistant Director	**MEDICAL ENTOMOLOGY DIVISION**
Dr.S.K.Parida, M.Sc., Ph.D.	Technical Officer	
Dr.R.K.Hazra, M.Sc., Ph.D.	Technical Officer	
Mr.N.S.Marai, M.Sc., LL.B.	Research Assistant	
Mr.H.K.Tripathy, B.Sc.	Technical Assistant	
Mr.G.D.Mansingh	Insect Collector	
Mr.B.Pradhan	Insect Collector	
Mr.C.S.Tripathy, B.Com. LL.B.	Insect Collector	
Mr.S.S.Beuria	Insect Collector	
Mr.G.Simhachalam	Insect Collector	
Mr.Banamali Nayak	Field Attendant	
Dr.R.S.Balgir, M.Sc. (Hons.), Ph.D.	Deputy Director (Sr. Gr.)	**HUMAN GENETICS DIVISION**
Dr. G. Bulliyya, M.Sc., Ph.D.	Senior Research Officer	
Dr.B.P.Dash, M.Sc., M.Phil, Ph.D.	Research Assistant	
Mr.R.K.Das, M.Sc.	Research Assistant	
Mrs. G. Mallick, M.Sc.	Research Assistant	
Mr.B.R.Sahoo, M.Sc., M.Phil.	Senior Research Fellow	**SENIOR/JUNIOR RESEARCH FELLOWS**
Mr.A.N.Nayak, M.Sc., M.Phil.	Senior Research Fellow	
Dr. Ratna Palit, MBBS	Senior Research Fellow	
Mrs. Sunanda Garabadu, M.Sc.	Senior Research Fellow	
Mr. Mahendra Panda, M.Sc.	Senior Research Fellow	
Ms. Kalyani Rath, M. Sc.	Senior Research Fellow	
Ms. Anamika Das, M.Sc.	Senior Research Fellow	
Dr. Alok Diwedi, MBBS	Senior Research Fellow	
Dr.B.Sahoo, MLISc., Ph.D.	Asst. Lib. & Inf. Officer	**LIBRARY & INFORMATION**
Mr.A.K.Mohapatra, B.A., LL.B.	Admin. Officer	**ADMINISTRATION**
Mr.G.Behera, M.A.	Section Officer	
Mr.R.C.Muduli, B.A.	Assistant	
Mr.P.C.Nayak, B.A.	Personal Assistant	
Mr.Abani K. Nayak, B.Com.	Personal Assistant	
Mr.A.P.Parida, B.A.	U.D.C.	
Mr.B.S.Rao	U.D.C.	
Mr.S.Nayak	L.D.C.	
Mr.R.Rath	L.D.C.	
Mr.S.K.Das, B.Com.	L.D.C.	
Mr.S.K.Majhi, M.A., LL.B.	L.D.C.	

Staff position as on 31.03.2003

Director' Office	Mr.L.S.Rao, B.A.	Private Secretary
	Mrs.R.Varghese	Steno
Accounts	Mr.R.V.Rao, B.Com.	Accounts Officer
	Mr.B.Sutar, M.Com.	Assistant
	Mr.S.K.Satapathy	U.D.C.
WORKSHOP AND INSTRUMENT MAINTENANCE	Mr.B.K.Biswal	Electrician
	Mr.S.Sutar	Generator Operator
	Mr.J.Behera	Pump House Operator-cum-Wireman
	Mr.B.K.Moharana	Plumber-c-Carpenter
ANIMAL FACILITY	Mr.A.Senapati	Animal House Attendant
	Mr.S.K.Das	Animal House Attendant
	Mr. Jaladhar Naik	Animal House Attendant
	Mr. Pandav Sahoo	Animal House Attendant
SUPPORTING STAFF	Mr.Md.Daulat Khan	Driver
	Mr.Sibaram Patra	Driver
	Mr.R.Pradhan	Driver
	Mr.Anakar Nayak	Driver
	Mr.A.R.Khan	Driver
	Mr.P.K.Behera	Driver
	Mr.R.C.Dash	Office Attendant
	Mr.K.G.Samal	Attender
	Mr.Chakradhar Naik	Sweeper-c-Attendant
	Mr.D.Chinna Rao	Sweeper
	Mr.K.C.Nayak	Sweeper
	Mr.Banamali Sahoo	Gardener
	Mr.Sankar Prasad Sharma	Watchman
	Mr.M.B.Thappa	Watchman
	Mr.R.S.Rai	Watchman
	Mr.Som P.Sharma	Watchman
	Mr.T.Bahadur	Watchman
	Mr.R.S.Bahadur	Watchman
	Mr.Sankar Bisoi	Cook-cum-Guest House Attd.
NNMB STAFF	Dr. S.K.Das, MBBS	Research Officer (Medical)
	Mrs. S. Paikray	Asst. Research Officer
	Mrs. Haraprava Sahu	Social Worker
	Mr. D.K.Mohanty	Steno-C-Office Asst.
	Mr. R.K. Sahoo	Driver
	Mr. J.K.Mohanty	Field Attendant

Studies on Filariasis





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INSIDE

ON-GOING STUDIES

Studies on Filariasis

Status:

Intramural (DBT funded)

Investigators:

Dr. M. K. Das,
Dr. M. S. Bal,
Dr. M.K. Beuria,
Mr. N.N. Mandal

Starting date: July 2001
Closing date: July 2004

1.1 Immunological characterization of filarial antigens with potential protective response in endemic population

Objectives:

1. Immunochemical characterization of Dssd1 and lipid antigens with potential for microfilariae clearance from infected animals.
2. To study antibody response to these antigens in "endemic normals" vis-à-vis infected population.
3. To study cytokine profiles induced by the specific antigens in order to understand the immunoregulatory mechanisms.
4. To conduct longitudinal study to elicit filarial specific immune response in endemic normals residing in filarial endemic community.

Background Information:

This Centre has earlier reported about two apparently dissimilar filarial antigens– a surface glycoprotein (Dssd1) and lipid antigens – which exhibited diminished antibody responsesin infected (circulating filarial antigen, CFA, positive) individuals irrespective of clinical and parasitological status. Antigen negative individuals exhibited elevated antibody response. Interestingly it was further shown that destruction of carbohydrate epitopes (Dssd1 contains 45 µg carbohydrates per mg of protein) resulted in reduced antibody levels in CFA negative, but not in CFA positive individuals. The result indicates the immunogenicity of carbohydrate epitopes of Dssd1 in infection free individuals. Active infection is associated with lack of antibody response to carbohydrate.

Results:

The nature of carbohydrate residues linked in Dssd1 was probed through lectin (carbohydrate-binding protein) coupled to enzyme (peroxidase) in lectin- ELISA. The lectins concanavalin A and wheatgerm agglutinins were used (Fig.1 & 2). The presence of D-glucose mannose, N-acetylglucosamine and sialic acid residues is indicted in Dssd1. Incidentally these residues are also present in the adult worm extract from which Dssd1 is purified. Antibody level to filarial lipid antigens was evaluated in circulating filarial antigen positive and negative sera. Antigen negative sera exhibited higher IgG level compared to antigen positive sera. However periodate treatment caused similar reduction in both the groups (Fig.3).

In order to understand the infection dynamics using immunological parameters (risk factors) a group of endemic normal subjects (n=30) is being followed up assessing their immunological status. Endemic normal subjects were selected as they are free from all infection (microfilarae/circulating filarial antigen (CFA) negatives, symptoms negatives) and adults were assessed so that they had been sufficiently exposed to *Wuchereria bancrofti* infection. At 10 month interval parasitological, clinical and immunological parameters (CFA assay, DSSd-IgG) were evaluated. Follow up data after 10 months showed acquisition of infection (antigenemia) in 3 individuals and the rest 27 remained normal. IgG level to the filarial surface antigen (DSSd1) was determined in these individuals.

Age-dependent prevalences of filarial infection and disease have been studied in many endemic regions. Similar studies for asymptomatic amicrofilaraemics (uninfected

individuals/endemic normals) have not been attempted. We have analyzed age-wise prevalence of endemic normals in a filarial endemic region of Orissa (n=1973) in the context of elephantiasis, the chronic stage of lymphatic filariasis. Elephantiasis cases were generally not observed below 20 years of age and their prevalence increased steadily from 21-30 year to 60 plus year age-class. Proportion of endemic normals exhibited a rapid decrease in the younger ages (initial 15 years) followed by a slow decline for another 15 years and afterwards exhibiting not much change, rather stabilizing with increase in age. The onset of stabilizing normal (uninfected) population indicates the acquisition of resistance as was also indicated from circulating filarial antigen assay. Lymphatic filariasis is a spectral disease – at one end there is elephantiasis manifestation and at the other end is the uninfected endemic subjects who are not yet diseased/infected (asymptomatic amicrofilaraemic individuals). In a sense both are related – it is the uninfected normals who either may eventually acquire infection and / or disease (like elephantiasis at the extreme case) or who could resist the infection and remain truly endemic normals (resistant/immune).

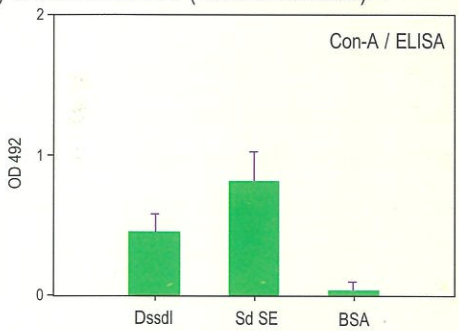


Fig.1: The binding of concanavalin A to filarial antigens

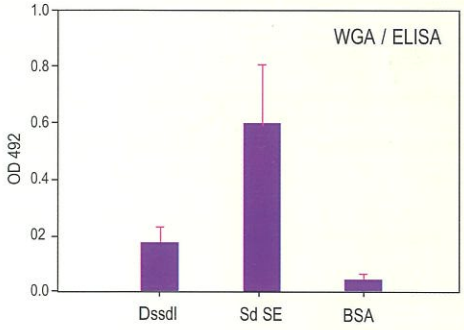


Fig.2: The binding of wheat germ agglutinins to filarial antigens.

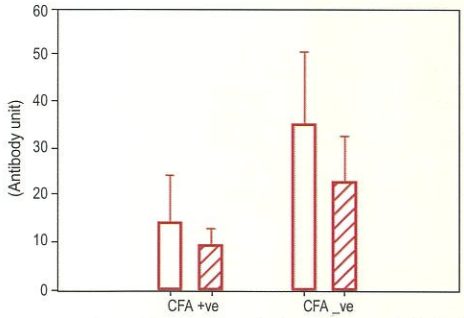


Fig.3: IgG response to native and periodated treated lipid in CFA+ve and CFA-ve sera.

Status:
Intramural

Investigators:
Dr.M.K. Das,
Dr. M. K. Beuria,
Dr. M. S. Bal
Mr. N. N. Mandal

Starting date: August 2001
Closing date: August 2004

1.2 Lymphatic filariasis in young children: An immunological perspective

Objectives:

1. To detect pre-patent infection through IgG4 and circulating filarial antigen assays.
2. Prevalence of anti-filarial antibodies in different age classes in children.
3. Follow-up of infection-free children to elicit their immunological responses.

Background information:

Microfilariae prevalence was found to be 6.54% in children (n=565) exposed to W. bancrofti infection (Khurda district, Orissa). But a higher rate of filarial antigenemia (25%) was reported in apparently normal children (n=466) living in villages in Khurda district, Orissa indicating the severity of infection. A vast majority of children are free from infection and is likely that a section of which might not be sufficiently exposed to the infection.

Results:

Dssd1-IgG level in 156 CFA negative children was determined. About 74% (123/166) IgG positivity was noted. But to Setaria extract -IgG positivity was higher (95%) indicating that these children are well exposed to filarial infection. Antigenemia was also determined in new group of children (n=203). The number of CFA positive children was 61 and CFA negative was 142. Eight children were found to be microfilariae positive. IgG4 antibodies were determined in children (n=83, CFA +ve =20 and CFA -ve =63). Thirty-four children were IgG4 antibody positive among which 14 IgG4 positives are CFA negatives.

A group of antigen negative normal children (n=40) was followed for parasitological/ immunological studies. It was found that only one child (9 year female) acquired microfilariae (antigenemia) after an interval of one year. The other children remained normal.

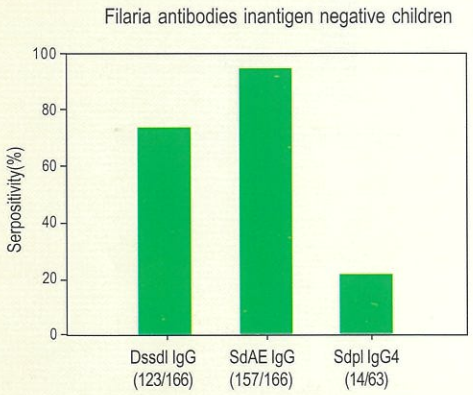


Fig.4: Filarial antibodies in antigen negative children.

1.3 A comparison of filarial immune response in people living in different (high and low) endemic regions of Orissa, India

Status:
Intramural

Investigators:
Dr. M. K. Das
Dr. M. K. Beuria
Dr. M.S. Bal
Mr. N.N.Mandal

Starting date: January 2002
Closing date: January 2005

Objectives:

1. To estimate the prevalence of anti-filarial antibody isotypes in the regions.
2. Age-profiles of specific antibody isotypes in endemic individuals.
3. To determine the prevalence of endemic normal individuals (infection-free) in the two regions.

Background information:

Antifilarial antibody levels and filarial antigenemia were measured in people living in an apparently low endemic region. It is of interest to note that a high rate of Og4C3 antigenemia (60%) was observed in normal individuals which in contrast to that of antigenemia (25-30%) in high endemic region.

Results:

A group of 248 adult individuals (age >18 years, 122 F, 126 M) was recruited for the study. Acute filariasis, hydrocele and elephantiasis cases were 8, 5 and 2 respectively. One individual (35 M) were found to be microfilaraemic (100 Mf/ml).

A high rate of antigen positivity (60%, 54/90) was observed similar to the previous finding. Anti lipid IgG antibodies were determined in 134 subjects. IgG positivity (39/134) of 29% was noticed.

1.4 Immunochemical characterization of filarial glutathione s-transferase and its protective potential in experimental filariasis.

Status:
Extramural (DST)

Investigators:
Dr. M. K. Beuria,
Dr. M. K. Das
Dr. M.S. Bal

Starting date: August 2003
Closing date: July 2005.

Research Objectives:

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

Progress:

The above project is approved by Department of Science and Technology, Govt. of India for funding in August 2003. Formal sanction and funding awaited.

As preliminary steps, Glutathione binding protein (GBP) having GST activity are being purified from the adult cattle parasite Setaria digitata using glutathione agarose column. This protein will be analyzed for molecular weight by SDS-PAGE. Western blott will be performed using sera collected from individuals living in Wuchereria bancrofti endemic area.

Status:

Extramural (EC Funded)

Investigators:

Dr. B. Ravindran,

Dr A. K. Satapathy,

Dr P. K. Sahoo

International Collaborators:

Dr. M. Yazdhanbakh, Leiden,

Dr. R. M. Maizels, Edinburgh,

Dr. R.Noordin, Malaysia,

Dr. T. Supali, Indonesia

Starting date: November 2001

Closing date: October 2004

1.5 Diagnosis of infection and morbidity in lymphatic filariasis: development of field applicable tools.

Objectives:

1. Identification of novel recombinant antigens for diagnosis of infection and disease
2. Identification of antibody reactivity patterns and other immunological markers of morbidity that can identify patients at risk of developing clinical disease
3. Verification of the dipstick assays as field applicable tools in endemic population affected by W. bancrofti and B. malayi infections before and after chemotherapy

Introduction and Background:

Human lymphatic filariasis is a spectral disease displaying diverse forms of clinical manifestations. It is assumed that repeated episodes of acute disease could eventually lead to development of chronic forms of disease such as lymphoedema/elephantiasis or hydrocele. However it is not clear what factors (parasite as well as host) contribute to this sequence of progression of the disease. Antibody responses in human filariasis have so far been largely studied by using crude extracts of different developmental stages of filarial parasites. However several of the filarial antigens have recently been cloned, sequenced and the full-length proteins have been expressed. Thus it is now possible to study antibody responses to specific filarial antigens expressed in one or other developmental stages of the parasites- the current study makes an effort in this direction. Since acute disease is perceived to lead to chronic forms of disease there is an urgent need to recognize molecular markers, which could be used for monitoring progression of the disease- quantification of plasma levels of pro- as well as anti-inflammatory molecules is expected to result in identification of such markers.

Results:

The objectives of this project are to identify molecular markers for assessing i) morbidity, ii) protective immunity as well as iii) immunodiagnostics in human lymphatic filariasis. Since these issues are diverse, three different approaches are being attempted. For identifying morbidity markers to monitor progression of chronic disease, a large panel of pro as well as anti-inflammatory molecules in circulation was monitored. The following molecules were quantified in different clinical categories: 1) IL-6, 2) IL-8, 3) IL-10, 4) TNF-a, 5) TNF-a receptor-55, 6)TNF-a receptor 75, 7) LPS binding protein (LBP), and 8) ICAM-1. The endemic population was categorized into the following groups and for analysis the levels were compared with those of endemic normals: i) Asymptomatic Mf carriers (AS), ii) subjects with cryptic infections, iii) elephantiasis patients, iv) patients with hydrocele, v) acute filariasis cases with filarial antigenemia and vi) acute filariasis cases without antigenemia. Quantitative analysis of circulating levels of the above molecules in the clinical spectrum of lymphatic filariasis offered interesting leads in understanding the clinical manifestations. Acute filariasis were characterized by significantly raised levels of IL-6, IL-8, IL-10, TNF-a and TNFR-55 when compared with endemic normals (the results are summarized in Fig 1). The investigations revealed very clear differences between two chronic manifestations of filariasis - patients with elephantiasis were found to have elevated levels of IL-6 and TNFR-75 while hydrocele cases were displaying enhanced levels of IL-8 and TNFR-55 (Fig.1to 3). Since the two TNF receptors are known to be biologically different the current study has offered a handle to address issues related to pathogenesis of these two diverse forms of chronic disease manifestations. None of the studied markers differentiated microfilariae carriers (AS) from

subjects with cryptic infections (CR). Both the groups were found to display elevated levels of TNF-a and TNFR-75 and decreased levels of ICAM-1 in comparison to endemic normals. The presence or absence of circulating filarial antigen failed to make any significant difference in the pro-inflammatory markers such as IL-6, IL-8, TNF-a and TNFR-55 in acute filariasis (Fig.1).

Antibodies to the following recombinant proteins were quantified human filariasis: 1) Abundant larval transcript-1 ;ALT-1; 2) ALT-2 ; 3) Serpin-2 (SPN-2) and 4) Cystein proteinase inhibitor-2 (CPI-2). The first two are molecules produced essentially by infective larval stages, while SPN-2 is synthesized only by microfilarial stages and CPI-2 is present on the surface of adult filarial worms. IgG antibodies to ALT-1 were significantly more in subjects free of patent infection (without circulating filarial antigen, (CFA) as compared to those who were displaying antigenemia (Fig.4). More significantly, an inverse association was observed between filarial antigen units and the IgG antibody levels to ALT-1 (Fig.5). These observations clearly indicated a role for IgG antibodies to ALT-1 proteins in restricting the infection load in human Bancroftian Filariasis. This notion is further strengthened by antibody titres in age-stratified endemic population- a progressive increase of anti-ALT-1 IgG was observed with increasing years of exposure to infective larvae in the endemic population (Fig.6). Recombinant proteins ALT-1 and ALT-2 were further used to quantify specific IgG sub-groups reactivity in four different categories of human filariasis. The results are shown in Figs.7a-d & 8a-d. The findings revealed a critical role played by these two dominant larval specific antigens. Enhanced IgG1 to ALT-1 was associated with active infection while enhanced IgG2 to ALT-1 was associated with development of pathology (Fig. 7a & 7b). Interestingly IgG3 ALT-1 was found to be significantly more in subjects with cryptic infections as compared to Mf carriers and levels of IgG4, (considered to be elevated in the infected population when tested using crude filarial antigens) was not found to be significantly different in the four clinical categories.

The IgG sub-groups reacting to ALT-2 were different from that of ALT-1 described above. Significantly elevated IgG1 was observed in endemic normals in comparison to Mf carriers and IgG3 to ALT-2 was found to be significantly more in patients with chronic disease and there was no significant difference in IgG4 levels reacting to ALT-2 in various clinical groups.

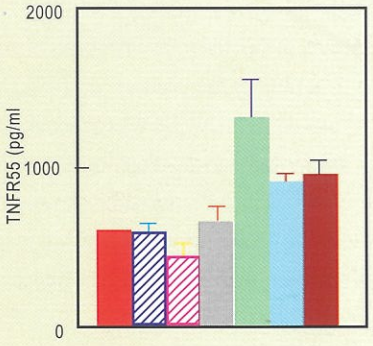
IgG levels to recombinant CPI-2 (an antigen present on the surface of adult worms) were significantly more in cryptic cases (CR) in comparison to Mf carriers (Fig.9). This indicates a role for this antibody in anti-microfilarial immunity since CR are free of circulating Mf but harbor adult filarial worms. Further, IgG levels to recombinant SPN-2, (an antigen present in microfilarial stages) were significantly more in endemic normals (EN), chronic cases (CH) and in subjects with cryptic infections (CR) in comparison to Mf carriers (Fig 10). This indicates a role for antibodies to SPN-2 in anti-microfilarial as well as anti-adult immunity. More interestingly, the higher levels observed in CH cases as compared to endemic normals indicates that very high antibody response to SPN-2 could be associated with pathology. Studies are underway to monitor the IgG subgroup levels to these recombinant proteins to evaluate the precise role of immune response in protective immunity as well as disease morbidity in human filariasis.

Fig.1

	EN	MF+	CR	Ele	Hyd	AC CFA-ve	AC CFA+
IL-6							
IL-8							
IL-10							
TNF-a							
TNF-R55							
TNF-R75							
LBP							
ICAM-1							

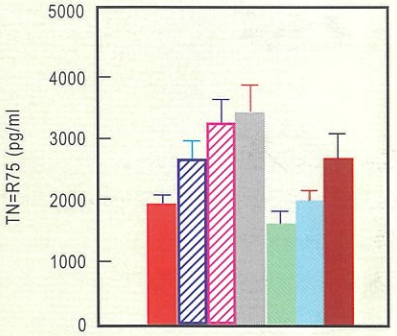
Fig.1 Summary of the cytokines level in clinical spectrum of human filariasis : Shaded area denote increase or decrease (as indicated) in comparison to endemic normals

Fig.2
TNFR-55 levels in filarial sera



* P<0.05

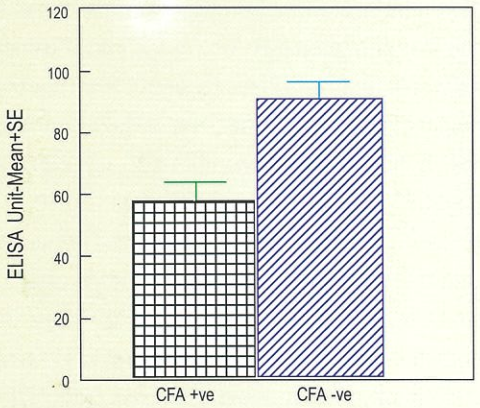
Fig.3
TNFR-75 levels in filarial sera



* P<0.05

Fig. 2 & 3: Plasma level of TNF- a receptor in filariasisspectrom (mean + SD):-
1:EN ; 2: Mf+ve CFA+ ; 3. Mf-ve CFA+ ; 4:Elephantiasis; 5:Hydrocele; 6: AC CFA-ve; 7. A CFA+ve

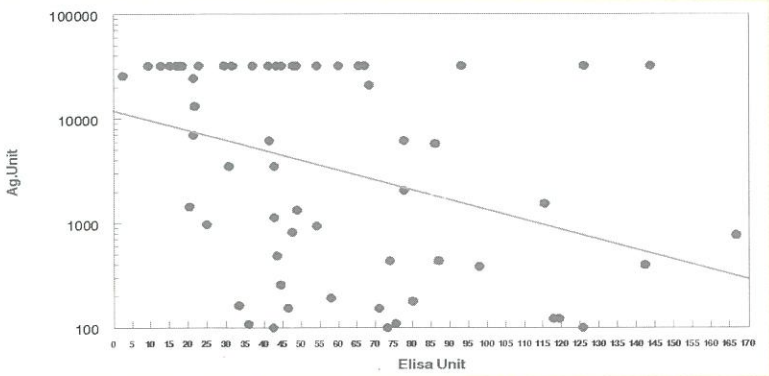
Fig.4



CFA -VE vs. CFA +VE: P<0.01

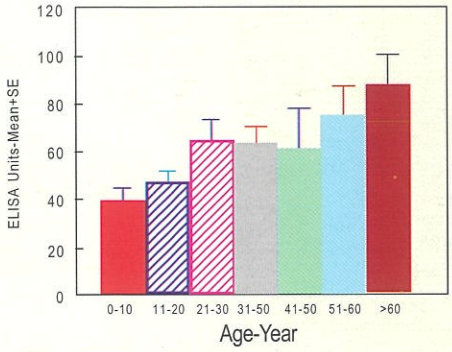
Fig.4: Antibodies (IgG) to ALT-1 in subjects with (CFA +ve) or without (CFA -ve) activ filarial infection

g.5



g.5: Inverse relationship between Anti -ALT-1 IgG and CFA Units in human filariasis

g.6



:60, r= 0.312 significant at 0.01 level

g.6: Antibodies (IgG) to ALT-1progresively increase with exposure as shown in an age-atified endemic population

g.7a

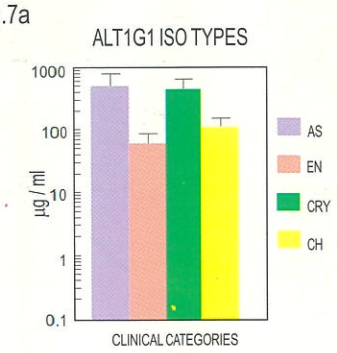
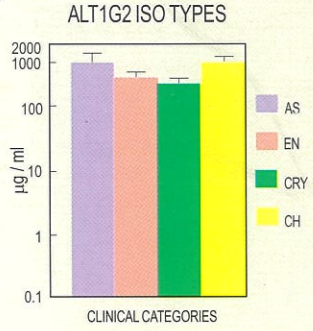


Fig.7b



g. 7c

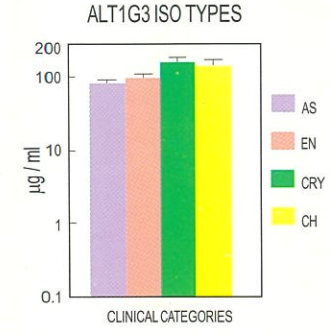
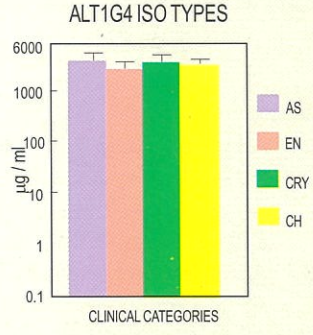


Fig.7d



g. 7 a,b,c,&d: IgG subgroups levels to recombinant ALT-1 protein in four clinical categories of human filariasis

Statistics:

IgG1: EN vs. CRY = -2.074; 0.045

IgG2 : AS vs. CH = -2.629; 0.012,

CRY vs. CH = -2.490; 0.017

IgG3 : AS vs. CRY = -2.792; 0.0085

AS vs. CH = -2.407; 0.021

EN vs. CRY =-2.155; 0.0384

Fig.8a

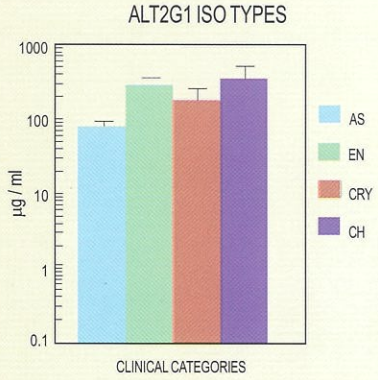


Fig.8b

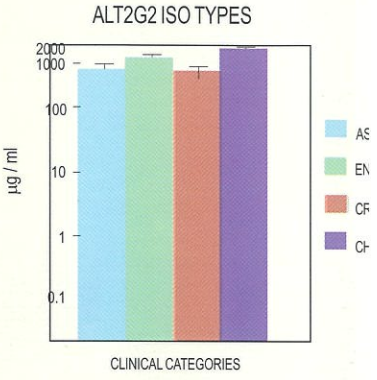


Fig.8c

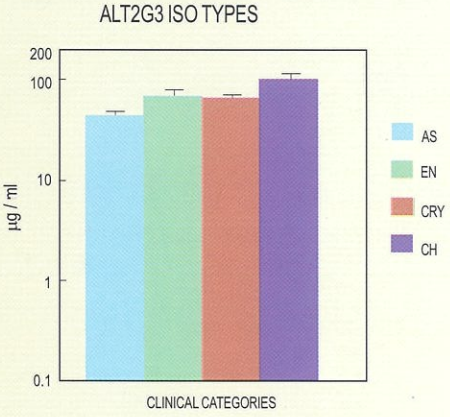


Fig.8d

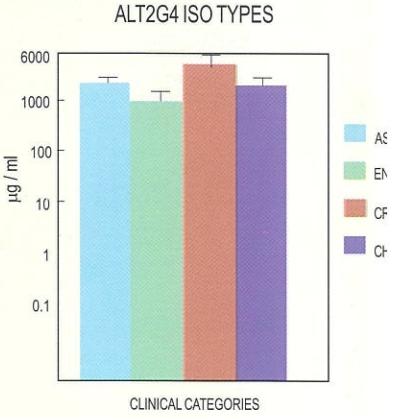


Fig. 8 a,b,c,&d: IgG subgroups levels to recombinant ALT-2 protein in four clinical categories of human filariasis

Statistics:

IgG1 : AS vs. EN = -3.606; 0.001

IgG2 : AS vs. CH = -2.937; 0.005

EN vs. CRY = 2.042; 0.049

CRY vs. CH = -3.109; 0.003

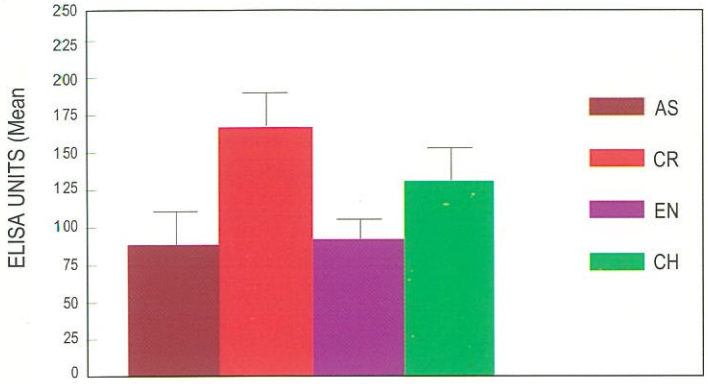
IgG3 : AS vs. EN = -2.164; 0.037

AS vs. CRY = -3.558; 0.001

AS vs. CH = -3.946; 0.0003

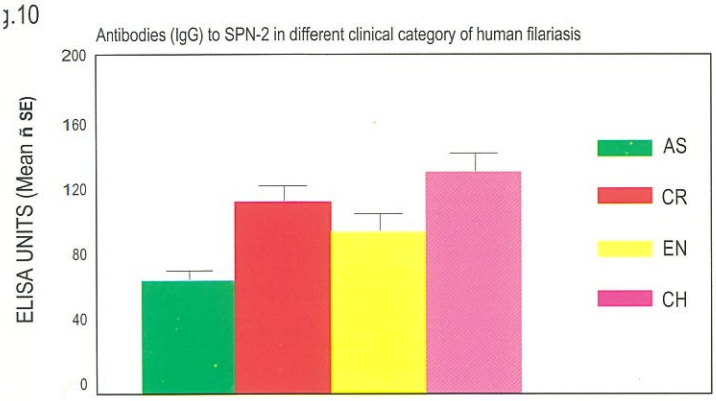
CRY vs. CH = 2.381; 0.023

g.9



S vs. CR - P=0.013
R vs. EN - P=0.008

g.10



S vs. CR: P=0.0001; AS vs. EN: 0.017; AS vs. CH: 0.0001
N vs. CH: P=0.032

5 Role of IgA in Protective Immunity in Human and Experimental Filariasis

Status:
Intramural

Investigators:
Dr. B. Ravindran, P.I.,
Dr. A. K. Satapathy,
Dr. P. K. Sahoo,
Mr. B. R. Sahoo.

Starting date: January 2002
Closing date: December 2004

BJECTIVES:

To correlate filarial IgA levels with clinical spectrum of Filariasis.
To correlate Filarial IgA levels with gender and duration of exposure to infection.
To identify by immunochemical analysis IgA inducing filarial antigens using as probes sera of putatively immune subjects.

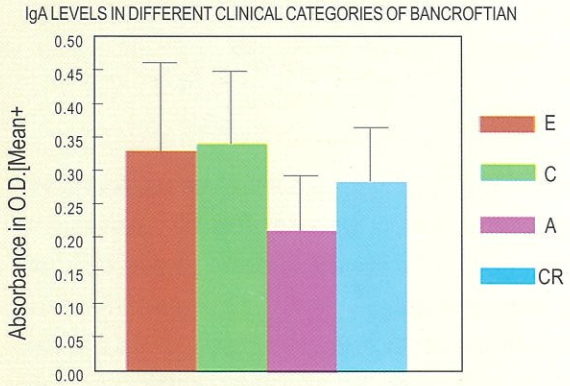
troduction and Background:

Putatively immune endemic normals (EN) and patients with chronic filarial disease H) such as hydrocele and/or lymphedema represent two poles of the clinical spectrum of iman lymphatic filariasis. Curiously however, the immune response phenotype in both ese two groups have been found to be essentially very similar, the exception being CH itients with active filarial infection (demonstrable by circulating Mf and/or filarial antigens, FA). Endemic normals and vast majority of CH cases display immunological hyper-reactivity aracterized by enhanced filarial specific T-cell proliferation, IFN-g production, raised levels

of parasite specific IgG2, IgE, decreased levels of IgG4 and presence of antibodies to M sheath in comparison to infected subjects who display immunological hypo-responsiveness The above immunological features however fail to differentiate EN cases (asymptomatic amicrofilaraemic subjects without antigenemia) from patients with chronic pathology and thus these features appear to be essentially a 'result' rather than the 'cause' of EN and CH status in endemic population. Identifying an immunological marker in EN is crucial fo understanding the nature of protective immunity and for a rational approach towards development of vaccines for human filariasis. Although serum IgA constitutes nearly 15 20% of total immunoglobulins in humans, no serious effort has been made so far to study the status of IgA in human filariasis in the context of protective immunity.

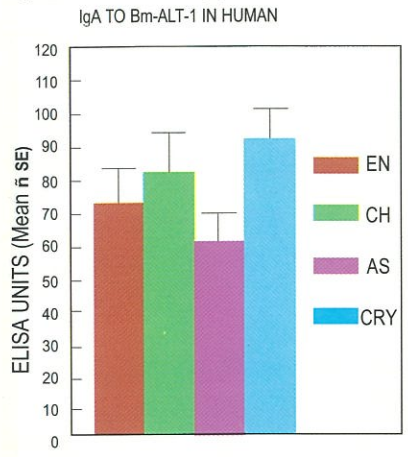
IgA in generally considered to be an antibody isotype with a role in mucosal immunity However, the importance of serum IgA in systemic helminthic infections is being increasingly realized since two high affinity receptors for IgA (Fc a) are found on the cell membranes o eosinophils which is considered as important effector cell in helminth immunity. Earlier using crude filarial antigens we had demonstrated a significantly elevated filarial IgA levels only in putatively immune endemic normals in comparison to infected subjects and patients with chronic disease. More significantly, the total serum IgA1 levels were found to be significantly decreased in Mf carriers indicating predisposition of such individuals to acquire paten infections (Fig 11). Using the following recombinant filarial proteins we further extended this study: (1) Abundant larval transcript-1, ALT-1; 2) ALT-2; 3) SPN-2 and 4) Cystein proteinase inhibitor (CPI-2) and the results are shown in Fig 12 a-d. IgA antibodies to ALT-1 revealed an interesting feature that differentiated microfilaraemic subjects from those with cryptic infections Subjects with microfilaraemia were found to contain significantly low levels of anti- ALT-1 IgA in comparison to other groups including those with cryptic infection (CR) indicating tha presence of Mf in circulation significantly down regulates IgA response to ALT-1. This did not appear to be due to lower levels of total serum IgA in these cases since no significan difference in IgA levels to CPI-2 and SPN-2 was observed in different clinical categories o human bancroftian filariasis (Figs 12a-d).

Fig.11



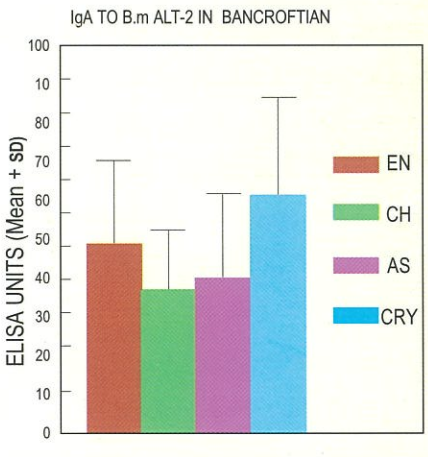
EN vs CH , p = 0.7723
EN vs AS , p = 0.0021
EN vs CRY , p = 0.2023
CH vs AS , p = 0.0002
CH vs CRY, p = 0.0734
AS vs CRY , p = 0.0088

Fig.12 (a)



AS vs CRY , p = 0.0224

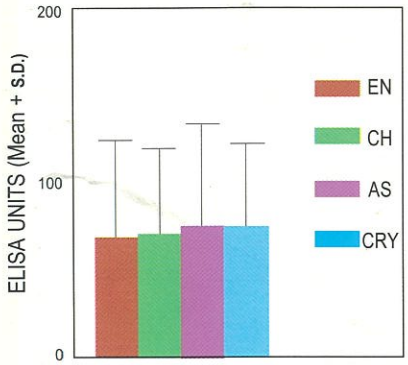
(b)



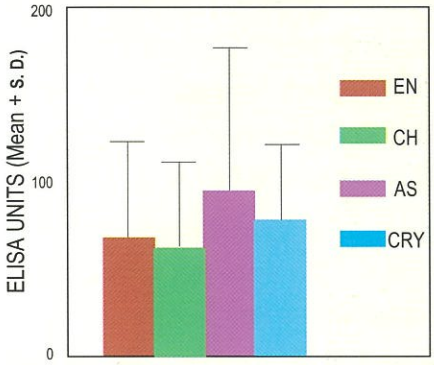
CH vs CRY = 0.0009

AS vs CRY = 0.0068

(c)



(d)



1.7 Innate Immune recognition of filarial parasites by phagocytes

Objectives:

1. To analyse the effect of Btk deficiency on macrophage phagocytosis of microfilaria in terms of cytokine production and effector functions.
2. To identify and characterise cell surface molecule/s involved in the uptake of mf by macrophages.
3. To compare the effects of such molecules on phagocytosis in vitro and parasite clearance in vivo.

Introduction and Background:

Most of the investigations in both human and animal models of filariasis generally address adaptive immunity and innate mechanisms if any are yet to be investigated. There are instances in animal models of differential susceptibility to filarial infections and it is presumed that innate mechanisms could be operational in those instances and result in the observed 'resistance'. The current study proposes to address some of these issues in filarial immunity.

Status:
Extramural
(ICMR Task Force on Parasite Immunity)

Principle Investigator:
Dr. B. Ravindran

Collaborator:
Dr. Vineeta Bal,
National Institute of Immunology, New Delhi

Starting date: January 2003
Closing date: December 2005

Results:

Initial investigations indicated that non-MHC related factors could contribute to microfilarial clearance at least in murine models of filariasis. Clearance of microfilaraemia in two different strains of mice were variable and was independent of MHC haplotype. Fig 13 shows that DBA/2 mice are more susceptible to microfilaraemia than BALB/c mice although having same MHC haplotype (H-2d). Similarly the Mf clearance was significantly rapid in CBA/J while it was very prolonged in C3H/HeN although both the strains have the same MHC haplotype (H-2 k).

We had demonstrated earlier that macrophages from x-linked immunodefficient mice (xid) lacking functional Bruton's Tyrosine Kinase (Btk) show poor NO induction and enhanced IL-12 induction contributing to delayed clearance of injected microfilaraemia. Since DBA/2 mice are more susceptible to microfilaraemia than BALB/c mice although having same MHC haplotype (H-2d) investigations were undertaken to study the macrophage function in these two strains of mice with a view to correlate their differential susceptibility with macrophage activity. It has already been shown that inflammatory responses induced by filarial nematode are mediated by LPS like molecules from endosymbiots, Wolbachia bacteria by signaling through the TLR-4 receptor. Based on this background, we have attempted to investigate the role of NO and macrophage effector functions as well as involvement of Toll like receptors in microfilarial clearance in DBA/2 mice. Peritoneal macrophages of DBA/2 mice produced less nitric oxide (NO) than BALB/c mice in response to TLR- 4 agonist LPS whereas there was no significant difference seen in NO production in response to TLR-2 agonist viz., peptidoglycan and also to IFN-g (Fig 14). Similarly, macrophages from BALB/c mice showed higher production of IL-1 as well as TNF- α than DBA/2 mice by stimulation with LPS whereas both the strains of mice produced equal amount of both the cytokines upon stimulation with peptidoglycan. However, IL-12 production in response to LPS was much higher in macrophages of DBA/2 mice as compared to BALB/c mice (Fig. 15). These results indicate that macrophages from DBA/2 mice have different functional characters for the TLR-4 mediated signal. This may be related both to poor nitric oxide production and lower microfilarial toxicity, but the mechanistic connections need to be identified.

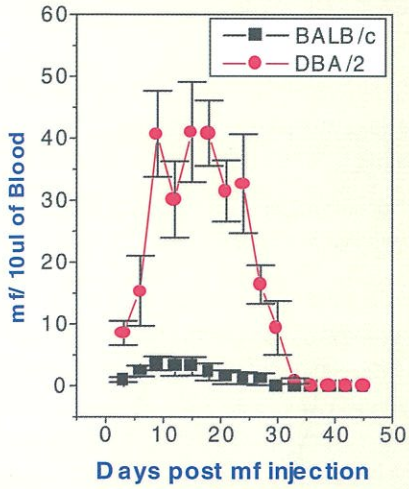


Fig.13: Microfilaraemia in DBA/2 and BALB/c mice: Poor mf clearance rate in DBA/2 as compared to BALB/c mice. The mice were infected with S.digitata Mf (5x105 per mouse) intraperitoneally and circulating microfilaraemia was followed over time.

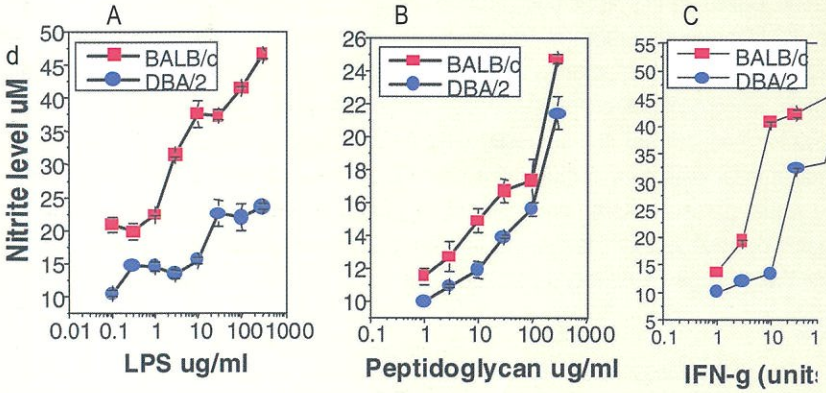


Fig.14 :Production of Nitric oxide by macrophages:

Peritoneal macrophages from Balb/c and DBA/2 were cultured with varying doses of either bacterial LPS (A), Peptidoglycan (B) or IFN-g (C) in triplicate culture. After 48 hrs, nitrite accumulation was measured in the culture supernatant and expressed in mM.

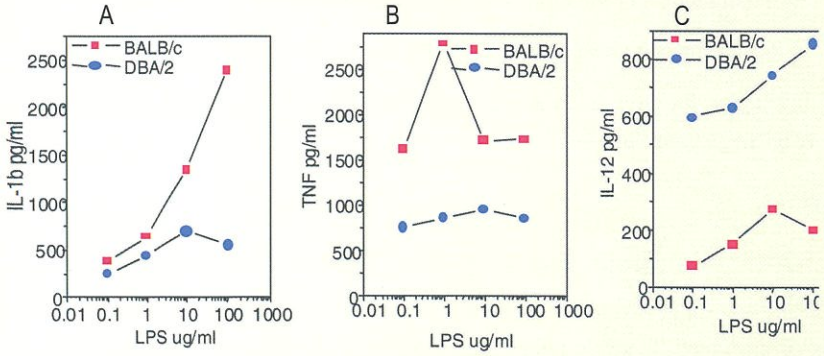


Fig.15: Production of cytokines by macrophages:

Peritoneal macrophages from Balb/c or DBA/2 were cultured with titrating doses of bacterial LPS for 48hrs and levels of TNF a (A), IL-1b (B) and IL-12 (c) induced were measured in the culture supernatants.

Status:
Extra mural (Indo-German project)

Principal- Investigator:
Dr. B.Ravindran
Dr. S.K.Kar

German collaborator:
Dr. Achim Hoerauf,
Bernhard Nocht Institute of Tropical Medicine,
Hamburg, Germany

Starting date: March 2003
Closing date: February 2006

1.8 Post -DEC reactions in Human Bancroftian filariasis: An Immunobiological study in Orissa, India

Objectives:

1. To study the role of endosymbionts Wolbachia in mediating reactions after administration of DEC in infected human subjects.
2. To study the role of endosymbionts Wolbachia in mediation of inflammatory responses in human filariasis during acute disease episodes

Introduction and Background:

Single annual dose administration of Diethylcarbamazine to the entire population in filariasis endemic areas has been recommended and being practiced in several countries including India for blocking transmission of infections in human communities. One of the major practical problems faced in this strategy is 'post-drug reactions' observed in a small percentage of subjects. However this small percentage could account for a large number of individuals when the drug is distributed to millions of individuals on a given day. The actual cause of these reactions is yet to be understood - some of the investigators have reported the reactions only in subjects with high Mf density and not in sublects with low or no Mf in circulation. Based on this it has been proposed that the dying Mf release 'toxic molecules' and could trigger such reactions. The discovery of endosymbionts Wolbachia in filarial parasites has offered an opportunity to study their role in post DEC reactions. Wolbachia are Rickettcia like organisms possess lipopolysaccharides, (LPS) generally found in Gram negative bacterial cell wall and are responsible for bacterial endotoxaemia. LPS are known to mediate inflammation by stimulating a cascade of reactions involving phagocytic cells. Unlike filarial parasites which are resistant to several antibiotics, Wolbachia are easily eliminated by treatment with Tetracyline/Doxycycline. The current project proposes to study the role Wolbachia in mediating 'post- DEC reactions' observed in Mf carriers.

Results:

The project was initiated one month ago and survey for identification of Mf carriers for recruitment to the study have been undertaken. The Mf have purified from parasite carriers for quantifying Wolbachia by real time PCR. The first batch of Mf carriers will be treated with Doxycycline or placebo to eliminate endosymbionts and both the groups will then be treated with single dose DEC to monitor post-drug inflammatory responses.

Status:
Intramural

Investigators:
Dr. A.K.Satapathy
Dr. P.K.Sahoo
Dr. B. Ravindran

Starting date: February 2002
Closing date: January 2005

1.9 Identification of serum immunosuppressive factors in human filariasis

1. To identify the immunosuppressive factors in sera of microfilaraemic subjects.
2. To correlate the degree of immunosuppression with presence/intensity of infection with adult stage parasite.

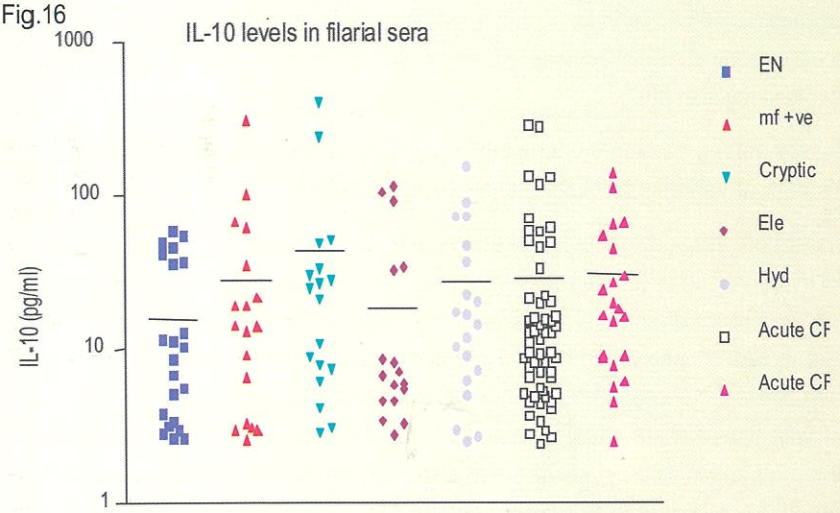
Objectives:

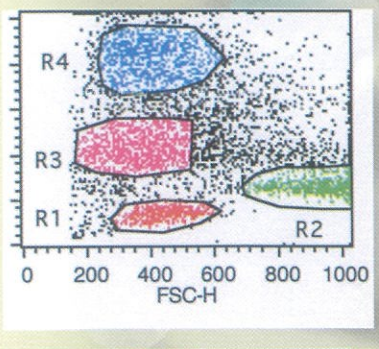
A Th2 type of hyporesponsive state observed in microfilaraemic individuals is associated with impaired T-cell immune response and high levels of IL-10. Anti-inflammatory cytokines such as IL-10 levels in sera of patients with human filariasis with different clinical manifestations were measured. IL-10 levels did not differ significantly between asymptomatic microfilarial carriers and subjects with cryptic infection (Fig-16). Significantly elevated levels of IL-10 were observed in acute filariasis in comparison to endemic normals, Mf positive

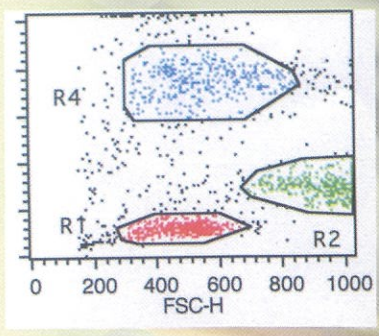
cases and cryptic cases. Since IL-10 has been shown to play an important role in down regulating antigen specific proliferative response in microfilaraemic sera, an attempt has been made to quantify IL-10 levels produced in in vitro by the Peripheral Blood Mononuclear Cells (PBMC).

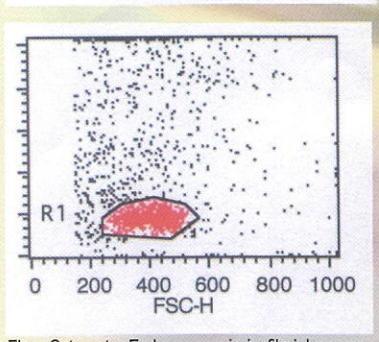
Although antigen specific immunosuppression has been well documented in filariasis, the contribution of serum factors in mediating suppression of T-cells proliferation has been not examined. An attempt has been made to examine mitogens such as PHA and CON A specific immune responses in microfilariaemic and amicrofilaraemics individuals. PHA specific cellular immune responses were examined in amicrofilariaemic persons. PHA mediated lymphocyte proliferation was significantly inhibited by incubation of PBMC with 10% sera from microfilaraemic cases indicating a role of serum factor in mediating suppression of lectin induced T-cell proliferation.

Fig.16









Flow Cytometry-Embryogenesis in filarial worms

1.10 Morbidity control in filarial lymphoedema: Controlled clinical trial and treatment seeking behaviour and utilization of health care services in endemic population of Khurda district of Orissa."

Status:
Intramural

Investigators:
Dr. A.S.Kerketta
Dr.B.V.Babu

Starting date: January 2001
Closing date: December 2003.

Objectives:

1. To evaluate the efficacy of long term use of oral antibiotic with foot care in the management of various grades of filarial lymphoedema.
2. Treatment seeking behaviour and utilization of health services of filarial lymphoedema cases in Khurda district, Orissa.

Progress:

A door to door survey was conducted in endemic villages to find out the cases of different grades of filarial lymphoedema. A detail clinical examination was done to check for the eligibility of the cases as per the inclusion and exclusion criteria. Out of these a total of 300 (100 for each regimen) cases were selected for the study. The allocation of the drug regimen was done by using the random number table (Permuted Block Design). After the allocation of drug regimen, all cases were closely monitored for one week for any side effects of drug. The limb circumference was measured on four occasions i.e. on 0, 90, 180,

360, 720 days. On each occasion of measurement, affected versus normal limb was taken at three fixed points (lower, middle and upper part of the limb) in cases of unilateral oedema. The data on measurement and ADL frequency were recorded. Case recruitment was completed and follow-up activity is continuing. So far 229 cases recruited for the study have completed one-year treatment with all the three drug regimen. The frequency of ADL attack among the cases was recorded during the follow-up period.

During the study 34 cases recruited were dropped out from the study due to various reason like unwillingness to continue (19), taken treatment for other disease (7), death (1) and the side effects like G.I. upset, Asthma or drowsiness. The base line information indicates that there is no difference between the age, pre Rx ADL frequency, and duration of the disease between the groups allocated with different drug regimen. The mean difference of limb circumference between affected and healthy limb was assessed for all cases. The interim analysis of the study shows the mean difference of circumference reduction was 10.5% in regimen (I), 8.6% in regimen (II) and 47.8% in regimen (III). Besides this, the frequency of acute episode of ADL attack was reduced by 54.4% in regimen (I), 25% in regimen (II) and 69.5% in regimen (III).

Survey among participants of clinical trail on practice, acceptability and perceived benefits of various morbidity management practices:

Simultaneously, in-depth questionnaire survey is undertaken among the patients participating in the clinical trial. So far 126 patients are covered. This survey is intended to study the acceptability, practice and perceived benefits after practicing various components of trial including the foot-care. In addition, a survey on knowledge and practice of morbidity control particularly foot-care was undertaken among lymphoedema patients in the community (n=100) and patients attended out patient department (OPD) of capital Hospital (n=180). The characteristics of the patients drawn from the community indicate that all are suffering from lymphoedema of one (38% of right limb, 26% of left limb) or both lower limbs (36%). And majority are with grade-III lymphoedema (63%), followed by grade-I (18%), grade-II (16%) and grade-IV (3%). Only 23% of the patients had consulted a doctor/clinic for treatment of lymphoedema. Majority of patients attended OPD are from urban areas and most of them are men. Among these patients, most are suffering from grade-I lymphoedema. Based on the earlier studies, six important footcare practices were identified and probed about them extensively. The proportion of patients practise these methods are shown in the Table. Relatively lower proportion of patients (60% of respondents in community and 42% of patients attended OPD) clean their affected limb specifically and regularly, apart from the bathing. This group of patients believed that the cleanliness of the affected limb would be helpful in reducing oedema. Remaining patients wash during bath only. Out of them, a very few patients make the affected limb dry immediately by blotting with dry cloth, and even make the web spaces dry knowing its usefulness. Massaging of affected limb is very rare and a few patients (20% of community based patients and 14% of OPD patients) massage the effected area with some oils, mostly with coconut oil. Regarding the use of comfortable footwear, majority of the patients use normal footwear but none use any specially made footwear. They bought bigger sized footwear to feel comfortable with lymphoedema limbs. Also they used simple slippers with one or two straps to protect the sole. Only 19%

of patients sampled from community and 25% of OPD patients put their affected limbs at elevated position particularly when they sleep. None of the patients, except two patients attended OPD, do exercise with affected limb. They move their affected feets back and forth frequently. 16% of patients in the community and 14% of patients attended OPD use bandage for compressing the affected limb and a few among them use regularly. Mostly they use cloth strip, and some people use commercially available bandages. The people, in general believe that compressing the affected part can reduce the oedema. Most of the bandage users are with lymphoedema grade-I and II.

The study is continuing. To complete the required months of follow-up in cases recorded and their socio-behavioural studies and survey the health personnel and study period require another 10 month.

Table-1: Enrolment of various grades of lymphoedema cases for allocation of different study Regimens.

Regimen	Grade-I		Grade-II		Grade-III		Total		
	M	F	M	F	M	F	M	F	T
I	19	23	21	13	13	11	53	47	100
II	19	22	17	17	10	15	46	54	100
III	19	21	16	23	9	12	44	56	100
Total	57	66	54	53	32	38	143	157	300

Table-2: Base line informations of cases recruited for the study

	Male			Female		
	R-1	R-2	R-3	R-1	R-2	R-3
Age (Mean + S/.D.)	48+13.6	46+13.6	46+15.7	46+10.7	44+15.3	46+12.0
Median	50	50	50	45	43	48
Pre Rx Mean ADL Frequency per year	3.2	2	3.6	3	1.4	3.5

Table-3: Mean limb circumference difference in cases treated with three regimen's at different period.

	Mean Limb circumference (Cms.)				
Regimen	0 Day	3 months	6 months	12 months	% Redn.
I (N=88)	4.2	3.98	3.80	3.76	10.5
II (N=64)	3.01	2.79	2.83	2.75	8.6
III (N=77)	3.81	1.99	1.91	1.99	47.8

· Significant (p<=0.05).

Table-4: ADL frequency before and during treatment in 3 regimen group.

Regimen	ADL frequency per year (Mean)		
	Before Rx	After Rx	% Redn.
I (N=88)	3.03	1.38	54.4
II (N=64)	1.88	1.41	25.0
III (N=77)	2.95	0.90	69.5

Table-5: Foot-care practices among lymphoedema patients(Community & OPD)

Foot-care practice	Patients from community Percent (n=100)	Patients from OPD Percent (n=108)
1. Regular cleaning of affected area	60.00	41.67
2. Massaging of affected area	20.00	13.89
3. Use of comfortable footwear Use of specially made footwear	60.00 0.00	97.22 0.00
4. Elevation of affected leg regularly	19.00	25.00
5. Exercise of affected leg	0.00	1.85
6. Use of bandage	16.00	13.89

1.11 Development and evaluation of community development and partnership strategies for drug delivery for the control of Lymphatic Filariasis in urban areas of Orissa, India.

Status:
Extra-mural (WHO/TDR)

Investigators:
Dr. B.V. Babu
Dr. A.S. Kerketta
Mr. A.S. Acharya
Prof. D.K. Behera, Sambalpur Univ.

Funding:
WHO/TDR

Starting date: July 2003
Closing date: May 2006

General Objective:

To develop and evaluate innovative strategies through community development methods for drug delivery to achieve higher rates of coverage and compliance, in annual single dose treatment with DEC for the control of lymphatic filariasis, in urban areas of Orissa, India.

Study Methodology

The study is planned to undertake in two phases.

1. Baseline study
2. Intervention

Overall objective of the baseline study:

To explore and identify opportunities within urban communities, which would help design innovative urban-specific intervention strategies for mass drug administration for elimination of lymphatic filariasis.

Specific objectives of the baseline study:

1. To describe the demographic, socio-economic, political and cultural structure and relationships within the community

a. Study the age/sex/educational/occupational/religion/caste/kinship and social networks of community residents

b. Understand the formal and informal structures for decision making for health and development issues.

c. Study formal and informal channels of communication

d. To identify subgroups requiring special intervention relevant to the development process towards MDA.

2. To assess the felt needs of the community (including health needs)
   a. Felt needs include the priorities as expressed by the community members for health and development

3. To identify stakeholders, understand their roles and assess their perceptions towards Lymphatic Filariasis, Mass Drug Administration, drug related issues, and their potential involvement in the development process towards Mass Drug Administration.

4. To identify and understand functioning of various ongoing health and development processes / activities (resource mobilization) carried out by GOs/NGOs/CBOs/ private sector in the urban community.

5. To assess the knowledge and perceptions of the community to LF and their perceptions and experiences (if any) with MDA.

To develop and evaluate innovative strategies through community development methods for drug delivery to achieve higher rates of coverage and compliance, in annual single dose treatment with antifilarials for the control of lymphatic filariasis, in urban areas of Orissa, India.

Study area and Sampling

PROGRESS:

The budget for the first year has been received in July 2003 and the baseline survey of the project is being initiated. The study instruments and sampling design have been designed.

The study is being undertaken in Choudwar town of Cuttack district, Orissa, and for the purpose of the study, the urban community will be categorised into four settlement patterns based on socio-economic status and infrastructure, viz., high income area, middle income area, low income area (slums) and hutments. The surveys to be undertaken are household questionnaire survey, focus groups discussions (amongst community leaders, members of different community based organisations, women's groups, etc.) and in-depth interviews with key informants of different strata of the urban community. The key informants could be elected representatives, municipality officials, health officials, office bearers of community based organisations, etc.

While it is understood that LIG and Hutment are well demarcated and list can be procured from municipal authorities, such clear demarcation between HIG and MIG areas

do not exist. For practicality, it is proposed that a purposive categorization of HIG and MIG may be done as under:-

HIG- wards which have more than 60% of houses are HIG.
MIG- wards which have more than 60 % MIG houses.

Steps for selection of households from HIG and MIG strata: All the wards of the town will be categorized into HIG or MIG for sampling and 2 wards from each strata viz. HIG and MIG will be selected randomly. All the streets/colony will be listed and 5 of the streets/colonies will be selected randomly from each ward. From each street/colony, a random start point will be selected and then 10 consecutive households will be selected.

Selection of sample slums and households: All the wards which have slums will be listed and 10 slums will be selected randomly. List of all the households will be obtained and 10 households per a slum will be selected randomly to get a total of 100 households.

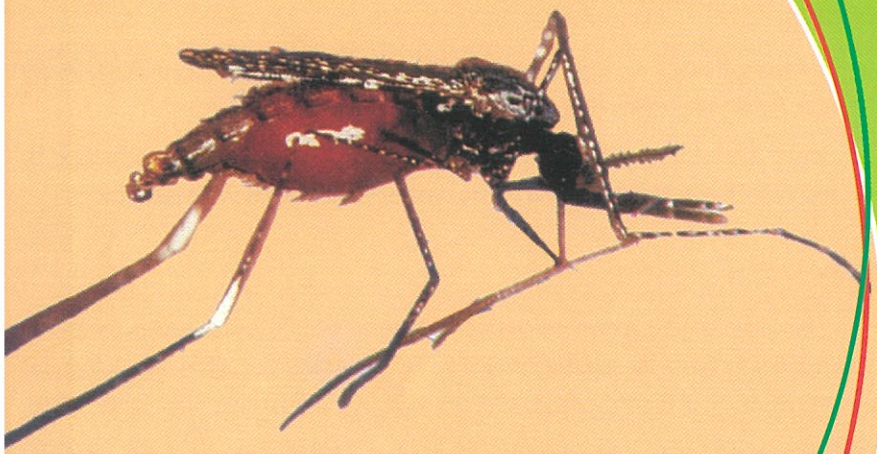
Objectives:

1. To find out the prevalence and aetiology of nutritional anaemia and haemoglobinopathies in four selected primitive tirbes Bondo, Didayi, Juanga & Kondha.
2. Clinical evaluation, management and monitoring of detected cases of anaemia and Haemoglobinopathies
3. To provide necessary supplementary intervention programme for formulating the future strategies of education and training to the Doctors at the PHC level.

During the period under report (April 2002 - March 2003), a detailed clinical examination and laboratory investigation on 1329 individuals belonging to Bondo (141) Didayi (363) Juanga (511) and Kandha (314) primitive tribes of Orissa has been performed. Based on their haemoglobin level, 47% of the studied population (41.3% Bondo, 39% Didayi, 49.5% in Juanga and 50.8% in Kondha) were found to be normal and 53% were having clinical signs / symptoms of anaemia. Taking WHO guidelines, it was observed that 25 out of 1329 total studied population (1.9%) were suffering from severe anaemia (< 7 g / dl), 535 (40.3%) had mild anaemia (9 - 11 g / dl), and 143 (10.8%) had moderate anaemia (7 - 9 g / dl). Various laboratory investigation and haematological test revealed that 56% of the anaemic cases had microcytic hypo chromic blood picture indicating iron deficiency anaemia. Amongst the various hereditary haematoglocal disorders detected during the study sickle cell disease was observed in 1.8% of cases. Haemoglobinopathy in form b thalassaemia in 2% cases and G6PD deficiency 2.3% cases among the studied population.

Appropriate intervention and follow up studies of cases revealed that, there is an improvement in haemoglobin status in 26.3, 24.2, 23.8 and 27.4% of the cases of anaemia in Bondo, Didayi, Juanga and Kandha population respectively.

Studies on Malaria



2

INSIDE

STUDIES ON MALARIA

Status:
Extramural (ICMR Task Force on "New Molecules through Genomic Research")

Principal Investigator:
Dr. Shobhona Sharma, TIFR, Mumbai

Co-investigator:
Dr. B. Ravindran
Dr. S. Ramachandran
Centre for Biotechnology, Delhi.

Starting date: November 2001
Closing date: October 2003

2.1 Towards the development of therapeutic agents using information from malaria immune persons from endemic areas of Orissa

Objectives:

1. To develop therapeutic agents through construction of a phage display antibody library from B-cells of persons clinically immune to malaria.
2. Specifically the drug targets of P0, Pf9 and Pf2 and other novel targets identified by the TIFR laboratory will be used for the development of therapeutic products.

Results:

Since the original immunoscreen was performed with Pf2 cDNA expression clone, it was decided to check the malaria immune sera against the Pf2-peptide. Fig. 1 A and B show the reactivity of the Pf2-peptide with the malaria immune adult sera samples from Orissa (India), and Ivory Coast (Africa), respectively. The cut-off value used was the mean OD405+ 3SD (Standard Deviation) observed with the sera samples from Orissa children' and healthy adults from Mumbai, India. In Fig. 2A and B, the Y-axis shows the ratio of the OD405 value to M+3SD value for each adult sample, and any value >1 was scored as positive reactivity with Pf2 epitope. For Orissa adults this was 86%, while for Ivory Coast this was seen to be 80%. The Pf2-peptide specific antibodies were affinity-purified from five samples and the antibodies were then tested by immunofluorescence (Fig. 2C). The reactivity on the IFA was specific for Pf2-peptide epitope, as this reactivity could be competed out in the presence of 0.5 mg/ml of Pf2-peptide solution. These affinity-purified antibodies were then used on GIA in two different sets of experiments, and the percentage inhibitions were observed to be 62% and 58% as compared to cultures without any antibody (Fig. 2).

It was decided to use various synthetic peptides to assess the antibody reactivity of the samples. PfP0 was represented with four peptides; N1 and N2 representing the amino terminal domain, and C1 and C0 representing the carboxy-terminal domains. Pf2 and Pf9 peptides were used for these two antigens. The carboxy-terminal 250 amino acid domain of AMA1 was used as a HIS-tag fusion protein. Fig. 1 shows the ELISA assays with Orissa sera, while Fig. 18 shows the results with sera from Kenya. It is clear that the response of adults is much higher as compared to that of children for each of the peptide antigens used. This is consistent with our differential screen, which had used immune versus susceptible sera for screening. These results also show that the reactivity of these peptide antigens with sera from immune adults is also observed in Kenya, Africa, and is not a peculiarity of Orissa, India. Thus, the reactivity of these samples showed that immune response is generated against these epitopes in Africa as well as in India. It was observed that the same immune sera samples reacted with the peptides, although the cut off parameters predicted different frequencies of reactivities for different epitopes. It has been shown that none of these peptides are cross-reactive and that these are distinct antigens on P. falciparum. Such data suggests that the immune responsiveness is a state attained by the immune adults, and that there is a general polyclonal activation achieved against several parasite determinants in the immune adults.

Fig.17

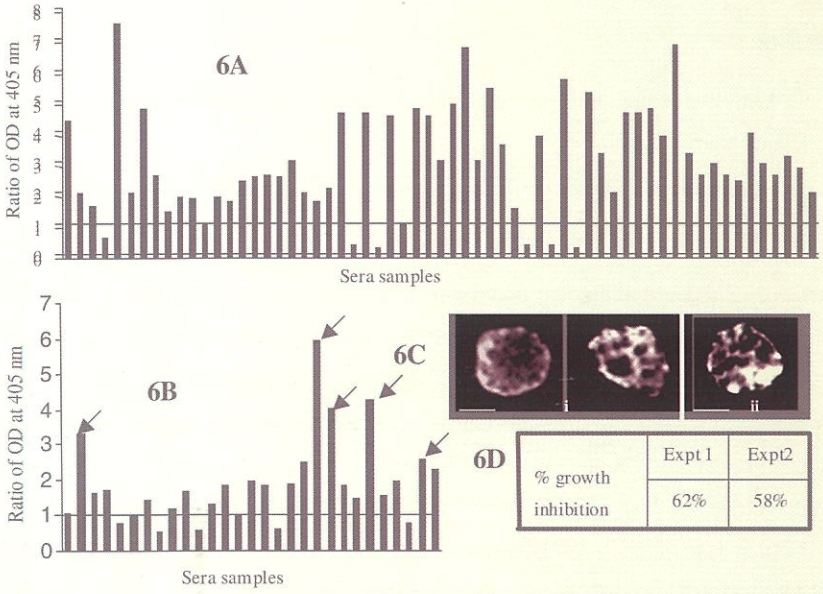


Fig 2

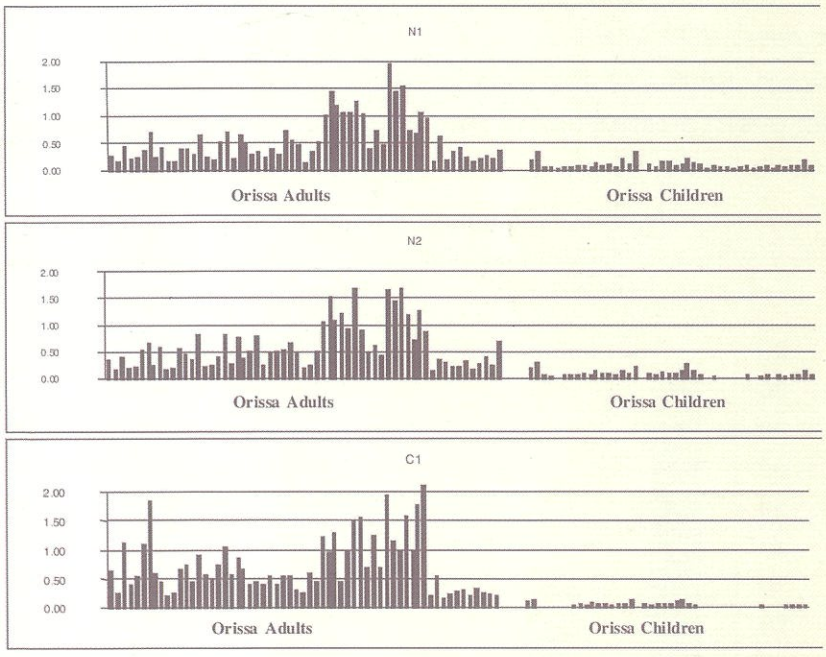


Fig. 2. ELISA analysis of 60 and 40 sera samples from adults (>12 years) and children (equal to or <12 years) respectively, residing in the Phulbani District of Orissa for the three peptides N1, N2 and C1 of the PfP0 protein.

Status:
Intramural

Investigators:
Dr. M.R.Ranjit
Dr. G.P. Chhotray
Ms. Anamika Das

Starting date: March 2002
Closing date: February 2004

(29th Annual meeting of Indian Immunology Society)

2.2 Populalation structure of *P.falciparum* in clinical isolates of Orissa Status: Intramural

Objectives:

1. To study the extent and / or frequency of genetic diversity in natural population of P.falciparum in Orissa.
2. To investigate the difference in parasite carrier sequence between complicated and non-complicated malaria cases.

A total of 72 (53 uncomplicated and 19 severe/ complicated cases) clinical isolates of P.falciparum collected from Kandhamal, Malkangiri, Keonjhar and Cuttack districts of Orissa were analysed for any allelic variation of GLURP, MSP 1, MSP2 and KAHRP genes. Parasite DNA was isolated from 100 µl of infected venous blood of cases by phenol extraction and ethanol precipitation. PCR and nested PCR was done to amplify the genes of interest using appropriate primers. Analysis indicate that the size of GLURP amplicon varies from 450bp to 1100bp. In case of MSP1, MAD20 type of allelic variant was present in more number of cases followed by K1 and RO33 in the samples studied. The FC27 type of sequence variation of the MSP2 gene was predominantly found, while in case of KAHRP gene 340 bp allele is more frequently encountered than the 400bp allele in the samples analysed so far. The mixed alleles in MSP1 and MSP 2 genes are more frequently encountered among severe / complicated cases than non- complicated cases (Figures 1A & B). This study indicates that parasite genetic composition could be playing a role in the development of complicated form of malaria in the population of Orissa.

FIG 1A: Prevalence of sequence specific msp1 gene of p.falciparum in non-complicated and complicated malaria cases

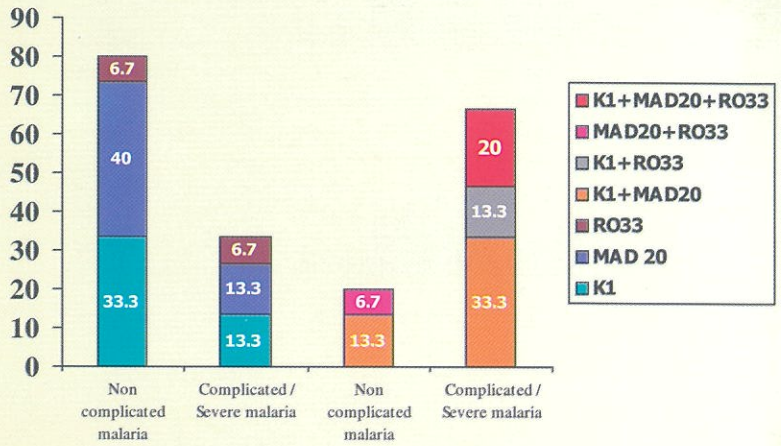
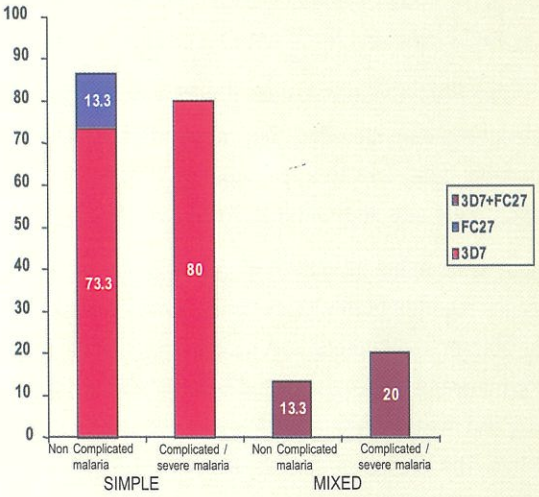


Fig 1B Prevalence of sequence specific MSP2 gene of P.falciparum in non complicated and complicated malaria



2.3 Anthropological Perspective of Malaria in KBK districts of Orissa

Objectives of the Project:

(i) To assess morbidity & mortality pattern of Malaria in KBK region and to map out malaria Prone areas in KBK region using epidemiological parameters.

(ii) To assess the knowledge, attitude, belief and practices (KABP) on malaria along with the health seeking behavior and health culture of the population in KBK districts.

(iii) To develop a suitable Social Mobilisation Package, for better Malaria control in the KBK region.

Background Information:

Malaria is a major health problem in Orissa and specifically in KBK districts. It is well recognized that Malaria exacts a heavy economic loss and exerts wide social impact by striking the most productive age group (15-45 years) of population. Preliminary estimates suggest that the average episode of malaria attack causes loss of work for seven days. Malaria imposes heavy burden on tribal women, who provide most of the household care and who also contribute major agricultural productivity. Pregnant and lactating women are especially susceptible to malaria because of their low immunity. One of the important reasons of high IMR in Orissa is ascribed to anaemia in pregnant women in tribal regions caused by malaria and infants affected with malaria infection. Out of the total population of KBK region, Scheduled Caste and Scheduled Tribe constitute 20% and 35% respectively. Malaria related morbidity and mortality show an increasing trend during the last decade out of the total malaria deaths of the state KBK region malaria mortality ranged from 22% (1990) to 33% (2000).

Method:

During the period six out of eight districts of KBK region namely Nuapada, Kalahandi, Sonepur, Bolangir, Nabarangapur & Malkangiri were surveyed. During each visit, interactions were held with district administration, health authorities, along with the peripheral health

Status:
Intramural

Investigators:
Dr. A. Mohapatra
Dr. R.K Hazra
Mr. D. P Hansdah
Mr. M. Panda

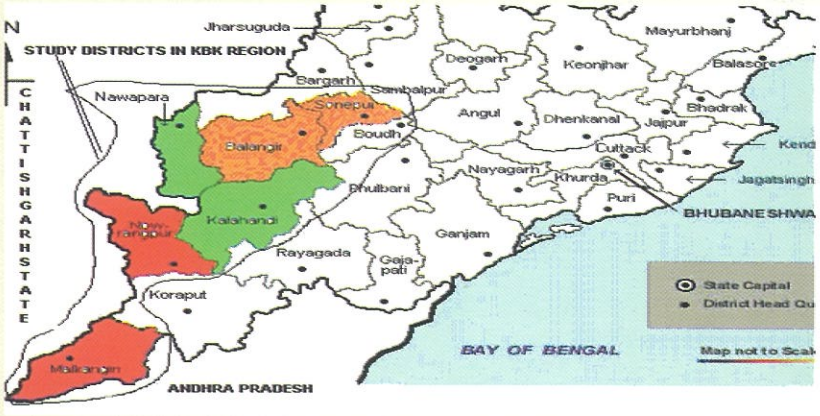
Starting date: March, 2002
Closing date: February, 2004

staff. Data pertaining to malaria were collected from the Districts, PHCs & Sub-centres as per their record. Micro-epidemiological analysis was carried out based on the data to identify high risk PHCs (following NAMP-WHO protocol).

Two PHC/ CHCs from each district were selected for the present study. The high-risk sub-centres were identified from the selected districts on the basis of malaria morbidity and mortality data. Two to three high-risk villages from each of sub-centre (based on population) were selected. Out of 8, 7 districts, 48 villages were surveyed.

The study parameters include (i) Morbidity status assessment by direct examination of fever cases reported from villages during survey period. This is carried out by confirming malaria infection by Para-check in central clinic method. (ii) Interviews of fever cases and matched number of no-fever reported cases in same village (iii) Household survey to record morbidity and mortality data and information on individual parameters like literacy, housing, income etc. The interviews were done on structured questionnaires mode as per standard method.

MAP SHOWING THE AREA OF PROJECT WORK DONE



Result

During the period, seven districts, Seventeen PHCs, Thirty-two Sub-centres and forty-eight villages were covered to illicit information from 609 respondants of KBK region. These respondants were further classified based on experience of malaria into three categories. Category-I: New fever cases (34.5%), Category II: Past experience of Malaria (38.2%) and Category III: Never suffered from malaria (27.3%). Nearly 63.1% of respondants were male and 72.7% are married. In the study area 53.7% of respondants were illiterate and 46.3% are literate and among them 25.1% are literate upto primary level of schooling. The major occupations of respondants were cultivation (36.1%) field labour work (22.7%), and collection of forest produce/ at home (31.4%). Collection of forest product is an important source of livelihood, which is lightly viewed by the tribal folks in this region. Around 42.7% of the respondants belong to the tribal group. The house type were mostly- Kuccha (58.3%). Houses are surrounded by paddy field (40.9%), forest (14.8%) bushes (32.8%) and contribute substantially towards malariogenic situation. Around 61% of respondants confirmed that their family members had experienced malaria in the past. In the study area 84.7% of respondant knew well about the symptoms of malaria and its vector mosquito as the carrier

33.8%. Thirty eight percent of respondants rank malaria as first and 45.2% give 2nd rank as per severity of the disease. Half of the respondants (50.1%) mentioned that during illness, they consult neighbours; few (14.3%) go to quacks. Only 22.4% of the respondants take proper treatment of malaria on same day, 49.4% after 48 hours. Preventive practices were poor among the population in KBK region; only 21.2% viewed prevention of mosquito bites would keep them away from malaria. Almost 43% of the respondants were ignorant (don't know) about the prevention practices. The response on treatment seeking behaviour elicited among respondants indicated that only 27.2% of population go to government health facility nearby, the rest go to Pvt. Practioner (23%) and local health personnel (16.1%). Nearly 33.7 % could not mention about the places where they can go for treatment of fever.

From the preliminary findings it is clear that though most of the people have correct knowledge about cause of malaria, but the attitude of the people and the practices related to malaria needs to be re-framed, so as to modulate the health seeking behaviour of the population of KBK region. The study is on-going.

Figure 1: Prioritization of health problems as perceived by respondants in KBK region (n=609).

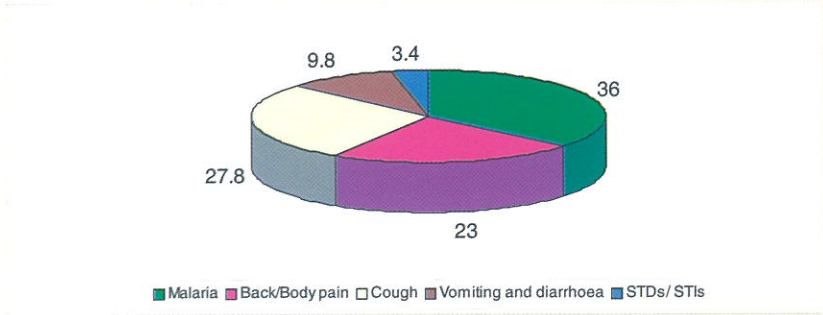


Figure 2: Rank given to malaria among all other diseases by respondants (n=609)

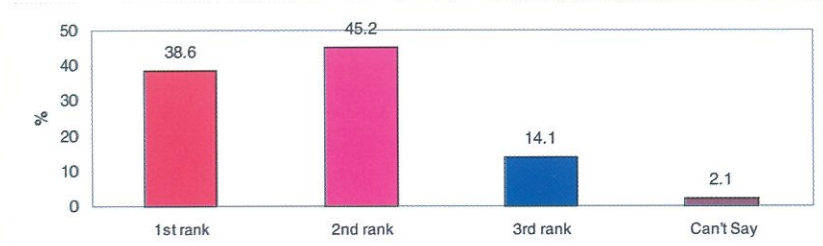


Figure3: Cause of Malaria as perceived by respondants (n=609).

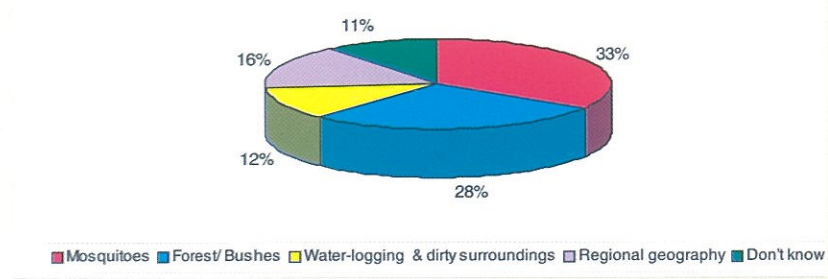


Table. 1: Information on background characteristics of respondants:

	Category of information	No. of respondants (n=609)	%
1.	**Category of respondant interviewed**		
	New fever cases	210	34.5
	Past experienced Malaria	233	38.2
	Never suffered Malaria	166	27.3
2.	**Sex of the respondant**		
	Male	384	63.1
	Female	225	36.9
3.	**Educational Status**		
	Illiterate	327	53.7
	Primary	153	25.1
	Middle	84	13.8
	Secondary	20	3.3
	Senior Secondary	25	4.1
4.	**Occupation of the respondant**		
	Cultivation	220	36.1
	Labour work	138	22.7
	Petty business	36	5.9
	Service	24	3.9
	Other work (House-work, Part time work, studying etc)	191	31.4
5.	**Ethnicity**		
	Tribal group	260	42.7
	Non-Tribals	349	57.3
6.	**House surrounding**		
	Paddy field	249	40.9
	Forest	90	14.8
	Bushes	200	32.8
	River	7	1.1
	Channel	63	10.3
7.	**House type**		
	Pucca house	58	9.5
	Semi-Pucca	196	32.2
	Kuccha	355	58.3
8.	**Drinking water sources**		
	Tube-well	364	59.8
	Open well	181	29.7
	Pond	64	10.5

Table. 2: Information on Knowledge, Attitude and Practices of Malaria in KBK Region (Source: Respondants response)

	Category of information	No. of respondants (n=609)	%
1.	**Opinion regarding concept of " Malaria Disease"**		
	Yes it is dangerous disease	233	38.3
	It is a common disease (less dangerous)	160	26.2
	Not at-all dangerous	192	31.5
	Can't say	24	4.0
2.	**Knowledge on "Cure of malaria"**		
	Yes	302	49.6
	Curable but not for ever	160	26.3
	Don't know	147	24.1
3.	**Knowledge of Symptoms malaria by respondants**		
	Chilled fever with severe headache, body ache	237	38.9
	Fever with regular interval with chilled and sweating, nausea	188	30.9
	Continuous fever with decreasing appetite, weakness	58	9.5
	Other symptoms	33	5.4
	Can't say	75	12.3
	Don't know	18	3.0
4.	**Malaria prevention practices followed by the respondant**		
	Prevent mosquito bite by using Neem oil/Coil etc.	129	21.2
	Eating good food and use of smog while at sleeping	135	22.2
	Message kerosene oil on body while jungle visit	83	13.6
	Not followed any prevention activity	262	43.0
5.	**Bed-Net use by respondants**		
	Using bed-net	83	13.6
	Not using net	526	86.4
6.	**Knowledge of any alternative traditional procedure of cure of malaria by respondants**		
	Use of Gangaseuli leave on empty stomach	94	15.4
	Use of neem/ saal leave smog	84	13.8
	Jhuna / Turmeric smog	130	21.4
	Use of Tulsi leave	67	11.0
	Bhuin-neem root juice	53	8.7
	Don't know	181	29.7
7.	**Effectiveness of traditional practices**		
	Yes effective	140	23.0
	Not effective	198	32.5
	Don't know the effectiveness	39	6.4
	Can't Say	232	38.1

Table. 3: Health seeking behaviour of respondants (during Malaria) studied in KBK region (n= 443)

	Category of information	No. of respondants (n= 443)	Response %
	Health seeking behaviour of respondant (During Malaria fever)		
1.	**Respondant first consultancy during fever**		
	Family member/Neighbours in the village	305	68.9
	Chiefly available village health practioner	87	19.6
	ANM/ AWW in the village	18	4.1
	Local PHC/ Hospital etc.	33	7.4
2.	**Suggestion conveyed to respondant at the time of fever**		
	Waiting for some time to confirm the fever	275	62.1
	To go for local practioner	121	27.3
	To go for local health care centre	30	6.8
	For consulting doctor	17	3.8
3.	**Time lag in treatment**		
	Immediate / the same day went for treatment	51	11.5
	Wait for at least 2 days	234	52.8
	Wait for 3 days	100	22.6
	Wait for 4 days of fever	50	11.3
	Wait for 5 and more days of fever	8	1.8
4.	**Effective places of malaria treatment (perceived by respondant)**		
	Govt. hospital	144	32.5
	Pvt. practioner	115	26.0
	Local Medicine man/ Magician	86	19.4
	Don't Know	98	22.1
5.	**Reoccurrence of malaria as perceived by respondant experienced of malaria**		
	Area and its surrounding is responsible	206	46.5
	Increase in mosquito population	85	19.2
	Belief of moving germ in the area etc	114	25.7
	Don't know	38	8.6

2.4 Situation analysis of malaria transmission in Bhubaneswar.

Status:
Intramural

Investigators:
Dr.N.Mahapatra
Dr.R.K.Hazra
Dr.S.K.Parida
Mr.D.P.Hansdah
Mr. N.S .Marai

Starting date: March 2001
Closing date: March 2004

Collaboration:
State Health Department, RHFW, BDA,

The study envisages situation analysis of malaria in urban set up of Bhubaneswar city in first phase while in 2nd phase for developing module for malaria control in urban slum and non-slum areas.

Objectives;

1. To assess the prevalence of malaria: disease and infection in the city.
2. To assess the vector population, and its incrimination for malaria transmission.
3. To assess the KAP and the health seeking behavior pattern of urban population of Bhubaneswar in relation to malaria.
4. To make appropriate recommendation for the implementation of Comprehensive vector control (CVC) programme for Bhubaneswar.

Progress:

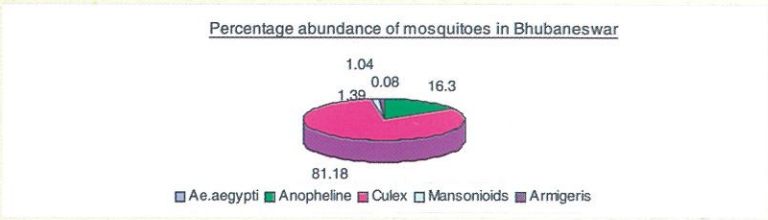
The health information on morbidity and mortality due to malaria was obtained from different Govt. Health facilities likes dispensaries, Municipality and Capital hospital of Bhubaneswar city. Central Malaria Laboratory records SPR that show an increasing trend i.e. a rise from 4 to 18 % with in last five years from 1998- 2002. The demographic data reveals the population of the city is 4,23,465 (1991 census) There are 59 authorised and 131 unauthorised slums with a population of 1,90,565 which is about 45% of the total population of the city. The Bhubaneswar city was divided into five ecotypes (ecozones) and each ecozone was assessed last year indicating number of slum and non-slum, water bodies, plantation type, number of health facilities (Zone 1- 5, Zone 2- 3, Zone 3- 3, Zone 4- 5 and Zone 5- 2) available during the year. The health information on morbidity data on malaria was obtained from Central Malaria Laboratory and Capital hospital. All the five ecotypes were reassessed to ascertain any gross change in developmental activities and human habitation. Population data on malaria was obtained in three seasons from five ecotypes from both slum and non-slum areas by making weekly visit to these areas and collecting blood slides from fever cases. Fever survey reveals that out of 451 blood smears collected from five zones of the Bhubaneswar and examined, 53 (SPR 11.7%) blood smears were found positive for malaria parasite. *Plasmodium falciparum* constitute 66% of the total positives.

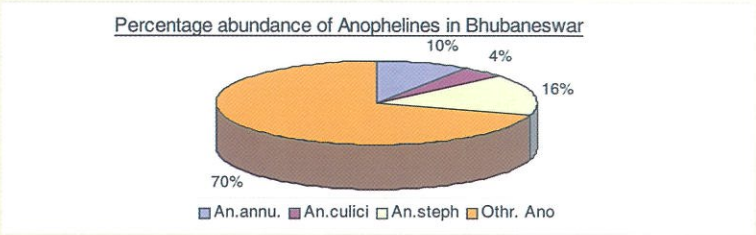
(Mosquito collection by RMRC Scientists)

Indoor resting collection could be done in slum areas only. In non-slum areas cooperation was not obtained from many houses for indoor collection. Larval survey's were carried out both slum and non-slum localities. Adult collections were done in morning and evening hours. A total of 5644 adult mosquitoes belonging to five genera viz. *Aedes*, *Anopheles*, *Culex, Mansonioides* and *Armigeris* were collected. Four known vectors, viz., *An.annularis, An. culicifacies* and *An. stephensi* were collected (Table1, Figure1). The presence of vectors of Lymphatic filariasis and dengue were also observed. By dissecting the *Cx.quinquefasciatus* all the larval stages of *W. bancrofti* were detected. None of the malaria vectors were found positive for *Plasmodium* on dissection.

Table-1 Relative abundance of different species of mosquitoes in Bhubaneswar

Species	Per man hour density
Aedes aegypti	0.05
An.aconitus	0.2
An.annularis	0.9
An.culicifacies	0.4
An.hyrcanus	0.9
An.stephens	1.5
An. subpictus	2.5
An. vagus	2.8
An.varuna	0.2
Cx. quinquefasciatus	42.7
Cx.gelidus	1.2
Cx. vishnui (group)	2.9
Ma.uniformis	0.4
Ma.indiana	0.4
Armigeris sps.	0.6





An.stephensi was prevalent in January, February, March, June, July and December. *An culicifacies* showed two peaks one in July and other in January. Absence of species in August, September and October was due to flushing effect of larvae. *An. annularis* showed higher density from November to February (Fig.1)

Figure1: Month wise per man hour density of Anopheline vectors in Bhubaneswar City (Year 2002-2003).

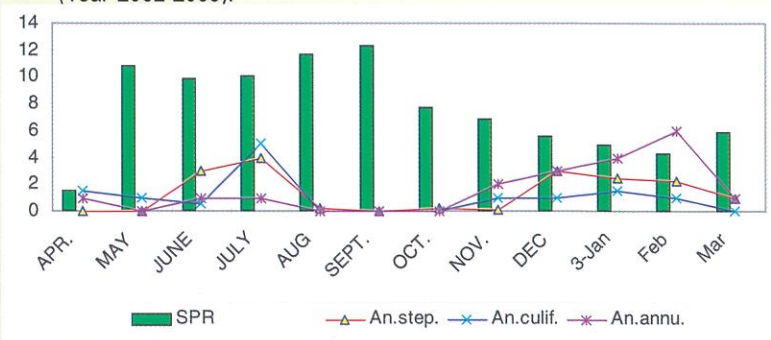


Table 2: Comparison of malaria incidence and vector density in 5 Eco-zones of Bhubaneswar

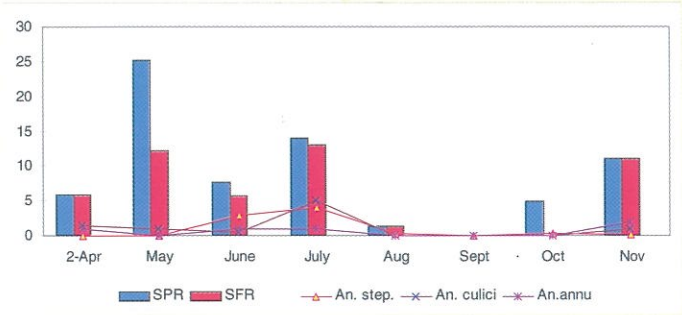
Parameter	Zone-1		Zone-2		Zone-3		Zone-4		Zone-5	
	Slum	Non-slum	Slum	Non-slum	Slum	Non-slum	Slum	Non-slum	Slum	Non slum
No .of fever cases	163	72	45	11	10	6	10	4	114	16
No. + Ve for malaria	21	10	5	0	3	0	1	0	10	3
Pf rate	52.4 %	50.0%	100%	0	100%	0	100%	0	80.0%	66.7
PMHD An.annularis	2.5	ND	0	ND	4.0	ND	0	ND	0	ND
PMHD *An.culicifaci-es*	1.1	ND	0	ND	1.3	ND	0	ND	0	ND
PMHD An.stephensi	0.1	ND	0.25	ND	0	ND	0.25	ND	0	ND

(Mosquito collection)

An. annularis and *An. culicifacies* were prevalent in Zone 1 and Zone 3 whereas An. *stephensi* were prevalent in Zone 1, Zone 2 and Zone 4. Prevalence of *An.annularis* and *An. culicifacies* in Zone 1 was due to the presence of rice fields while in Zone 3 their presence was due to river bed pools and paddy fields (Table 2).

Data on fever cases, slide examined, slide positive for malaria parasite were collected from both slum and non-slum areas. Data on fever cases were obtained from Govt. health facilities and compared with PMHD of vector species. Besides data on fever cases, slide examined for slum and non-slum area by us every month from April to November 2002. In slum areas data on fever cases were compared with data on vector density for that period.

Fig 2: Comparison of per man-hour density of malaria vectors and SPR and SFR of Bhubaneswar city



Larval collection. Details of the larval collection are depicted in Table.3. Larvae were collected from more than 353 number of breeding places (Zone1- 70, Zone2-68, Zone3-80, Zone 4-75, Zone5-60) viz., cesspools, canals, wells, overhead tanks, cemented tanks, waterlogging of the roof for curing of the building, paddy fields in and around Bhubaneswar. A total number of 2307 dips were taken out of which 641 dips were positive for anophelines larvae. The potential breeding of *An. culicifacies* was found to be the rice fields and riverbed pools. *An stephensi* was found to breed in cement tanks and in the ornamental fountains, artificial lake and also in the water logged with the vegetation. *An.annularis* was found in paddy fields with vegetation.

Table3: Distribution of Anopheline Larvae in different breeding habitats of Bhubaneswar

Habitat	No. of dips	Number positive for larvae	Number of larvae per positive dip
River bed pools	725	164	4.07
Canals	101	7	2.8
Pit	475	111	5.4
Ornamental pool	262	140	2.77
Water logging	5	0	0
Cess pool pit	112	3	261.3
Cemented pool	84	34	3.97
Tyre	1	0	0
River pit	30	14	1.37
Cesspool	80	14	2.21
Canal pit	10	0	0
Ornamental lake	50	5	1.2
Cemented tank	71	54	18.85
Stone quarry	150	37	7.48
Paddy fields	116	23	2.26
Pucca drain	35	35	1.6

Figure3:Malaria incidence of 5 ecozones of Bhubaneswar (Source: RMRC,BBSR)

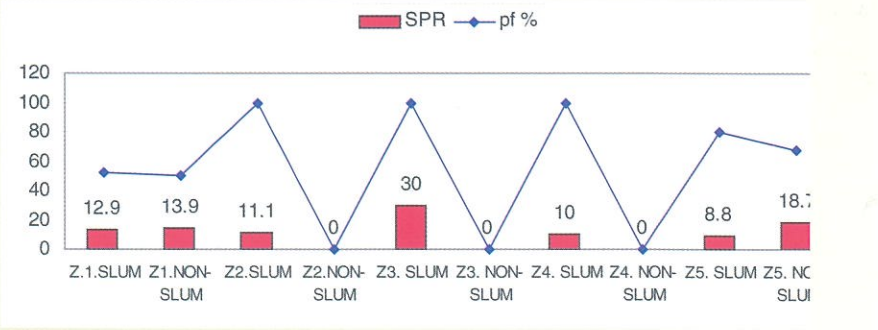
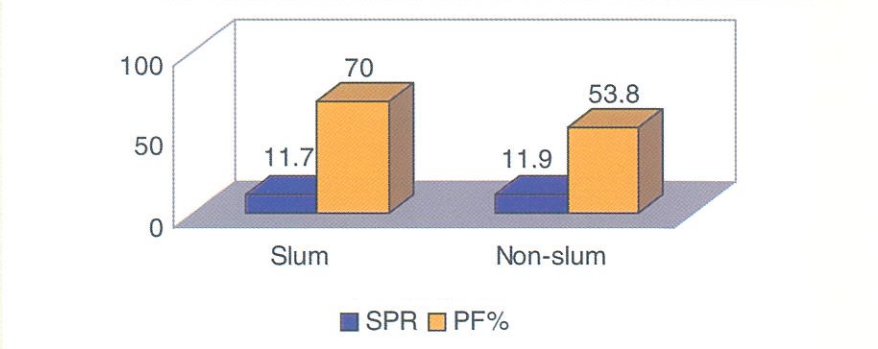


Figure 4:Comparision of malaria incidence between slum and non-slum areas of Bhubaneswa



(Source: RMRC,BBSR)

Our survey reveals slide positivity rate (SPR) varies from 8.8 to 18.7 in different zones o

' Bhubaneswar(Fig.3). SPR in slum and non slum areas was 11.7 11.9 respectively Fig.4

KAP findings :-

Knowledge ,Aptitude and Practices (KAP) related to malaria were elicited of 320 respondants from 11 slum areas and 13 suspected malaria cases those who visited RMRC laboratory from Bhubaneswar city, most of these urban slum populations were from rural and tribal areas. Most of the populations are migratory populations who have come to Bhubaneswar to earn a living. Some of the respondents have come from highly malariogenic places like, Ganjam, Koraput, Anugul , Mayurbhanj , Dhenkanal etc.

The findings of this survey are, **Housing pattern:** majority of the houses were semi Kuccha (66%) and had 2 rooms only. Almost 1/3rd of the households had 4 members. Cattle-shed was present in (37%) of the houses. **Sex and marital status of the respondents:** the male female respondent ratio is 9:7 and most of them are married (66%). **Literacy and occupation:** 39% of the respondents were illiterate while 33% had primary education. Major parts of the population were daily wage labourers (72.8%).**Knowledge about malaria:** 65% of the populations consider malaria as a disease while 23.4% consider malaria as a feverish condition. 20% of the respondents know about normal malaria, 42% know about brain malaria and 37% know about the both. 46% people know that mosquito bite is responsible for malaria. 22.8% consider malaria as a communicable disease. **Sleeping habit:** 34.7% of the population sleep indoors, 36.9% sleep outdoors, 14.4% sleep outdoors with bare body. **Personal protection methods:** almost all the households used some protection methods against mosquito bite. 40.4% use mosquito repellents, 44% use mosquito net and 16% use both. **Malaria cases:** 20.6% of the respondents have suffered from malaria within 1year. **Treatments procedures adopted by people during fever:** around 55% of the population had good knowledge about malaria treatment. Maximum number of people followed homeopathic treatment while suffering from malaria, as it is much cheaper.28.4% took medicines from shops (Quacks) and only 20% consulted doctors. **Population movement and malaria:** 45.6% of people visited their native place once in every three months. 31.3% visited every month, 11.9% visited once in six months and 10.4% visited yearly once. 5.6% of the people got malaria within one month of return from their native place.

Water analysis: Water samples were taken from various types of breeding habitats and water analysis was carried out. Parameters like pH, Nitrate, Temperature, Chlorine contain, Iron, Hardness etc were tested. It is noticed that when the water is alkaline density of *Anopheline larvae* was more. Most of the samples with chlorine concentration more than 0.5 ppm had no or very less larvae. Further, analysis is being carried-out to find out the significance of the other parameters on the density of *Anopheline larvae.*

Table: Physio chemical factor of Anophiline breeding habitats

Mosquito species	Habitat	Density of larvae	Temp. (c)	pH	Nitrate (ppm)	Iron (ppm)	Chlorine (ppm)	Total hardness (ppm)
An. vagus	Artificial lake	0.4	(26-34)	(5-9)	(0-15)	0-10	(0-0.1)	100-120
An. hyrcanus	Rice field	0.2	26-28	6-8	10-25	0-50	0	60-100
An.stephensi *An. culicifacies* *An. vagus*	Ornamental fountain	0.4	26-34	5-8.5	5-20	0-25	0-0.5	70-140
An. vagus *An. hyrcanus* *An. subpictus* *An. jamessi*	Cess pool	0.4	22-36	6-9	5-25	5-15	0-0.2	90-120
An. vagus *An. subpictus*	Cess pit	0.3	26-34	6-9	0-25	0-30	0.1	50-110
An. vagus *An.stephensi*	Cemented Tank	0.4	26-32	6-9	5-15	5-20	0-0.2	110
An. vagus *An. annularis*	Riverbed -pool	0.5	22-34	6-9	5-15	5-20	0-0.2	50-120
No emergence	Pucca drain	0.06	26-28	5-8	5-20	0-10	0	100-110
Nil (under	Septic tank construction)	0	26-28	5-6	10-30	0-10	0-0.5	———
Nil	Over head tank	0	34-36.3	0-5	5-15	0-10	0-0.8	——-

Studies on Tribal Health

3

INSIDE

STUDIES IN TRIBAL HEALTH

Status :
Intramural

Investigators :
Dr. M.R. Ranjit
Dr. G.P. Chhotray
Dr. B.P.Dash

Starting date: April 2001
Closing date: March 2004

3.1 Studies on molecular variants of G6PD deficiency with special reference to G6PD Orissa (44 Ala ® Gly) among malaria endemic tribal populations of Orissa

Objective:

1. To study the G6PD deficiency among the male tribal population of malaria endemic areas
2. To characterize the G6PD deficiency variants at the molecular level.
3. To study the clinical profile, morbidity and mortality pattern in G6PD deficiency population with special reference to G6PD Orissa.

During the period under report, a total no. of 778 individuals belonging to Kolha (n = 178), Desia Kandha (n = 286), Kutia Kandha (n = 242) and Dongria Kandha (n = 72) tribes of Keonjhar, Kandhamal and Malkangiri district were screened by DCIP decolorisation test. Of the total cases 38 (4.9%) were found to be deficient for G6PD activity. For molecular and biochemical analysis of the G6PD variants, 2 ml of venous blood from the deficient individuals were collected in ACD anticoagulant. Genomic DNA was extracted by chloroform - phenol and ethanol precipitation. The exon III & IV of Gd gene was amplified by PCR and amplicon was subjected to Hae III digestion. All the deficient samples were found to have lost one restriction site of Hae III indicating the mutation to be of "G6PD Orissa" type. The enzyme activity ranges from 6.7 to 11.5 1U / gHb in normal individuals and 1.2 to 2.7 1 U / gHb in deficient individuals. The Km value for NADP was found to be significantly higher ($P < 0.001$) in deficient samples than the normal ones. The clinical profile of G-6PD deficient cases so detected were assessed. The haemolysis status of RBCs of G-6PD deficient cases have been analyzed. The sensitivity to primaquin and other attending drugs will be assessed.

Lane M = Phi X 174 DNA / I Digest, Lane 1 = undigested PCR product of exop 3 and 4, Lane 2 = Hae III digested amplified fragment of a non deficient sample, Lane 3 & 4 = Hae III digested amplified fragment of G6PD, Orissa mutant

3.2 Intervention programme for Cholera, Intestinal parasitism, Vit A deficiency and Scabies amongst the primitive tribes of Orissa.

Status :
Extramural (ICMR Task Force)

Investigators :
Dr. G.P. Chhotray
Dr. B.B. Pal

Starting date : February 2000
Closing date : January 2005

Objectives:

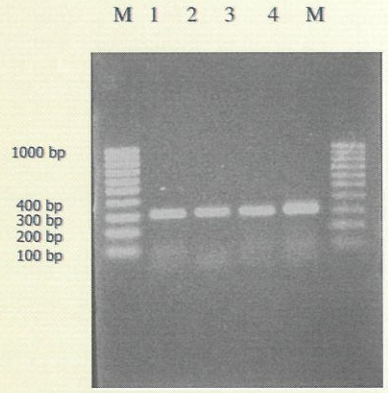
1. A comprehensive assessment of health status and epidemiological profile in respect of cholera, intestinal parasitism, Vit-A deficiency and scabies will be performed in 4 identified primitive tribes such as Didayi, Bondo, Kondha and Juanga out of 13 primitive tribes residing in Koraput, Dhenkanal, Phulbani and Keonjhar districts of Orissa.
2. Demographic profile studies reflecting the morbidity and mortality patterns arising out of these disease and their clinical evaluation.
3. To assess the awareness of health, health culture and related behaviour to carry out various intervention programme with a view to enhance their acceptability.
4. To plan and execute various intervention programmes among these beneficiaries with a view to augment the existing health care delivery system in those areas.
5. To formulate and develop a module with aim of educating and training the medical and paramedical workers at PHC level in health care delivery system - a future strategy for timely detection and management of these diseases.

This community based pilot study involving 4 primitive tribes in Bondo, Didayi, Kandha and Juanga have been undertaken.

The situation analysis, baseline data collection, detailed clinical examination and laboratory investigation were done to assess the morbidity pattern arising out of cholera, intestinal parasitism, vit - A deficiency and scabies in a selected sample population of 1329 (Bondo: 141, Didayi: 363, Juanga: 511, Kandha: 314). During the period under report (April 2002 - March 2003).

a) Diarrhoea including cholera: There are sporadic outbreak of diarrhoeal disorders including cholera throughout the year attaining its peak during the period July to October (rainy season). During the period under report, 401 rectal swabs were collected from the diarrhoeal cases (Bondo: 109, Didayi: 78, Kutia kandha: 154 and Juanga: 60) from both community and hospitalized cases and were bacteriologically analysed after being transported to RMRC laboratory. Amongst the rectal swab analysed 44.2% were found to be culture positive for various enteropathogens like V.cholerae, E.coli, Shigella and Salmonella. 55.8% were culture negative.

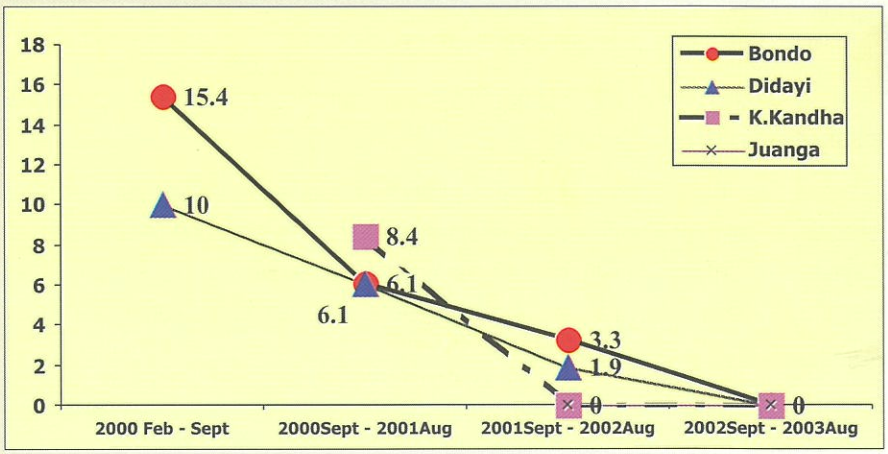
The bacteriological analysis of rectal swab's revealed V.cholerae in 2.8% of cases (V.cholerae O1 in 2.8% and O139 in 0.0%), E.coli in 38.9%, Salmonella 0.25% and Shigella spp. in 2.2% of cases. Suitable intervention during diarrhoeal outbreaks (ORS and antibiotics) were administered to cases having mild to moderate signs / symptoms and IEC activities were undertaken in the selected communities. It was observed that there is a progressive decrease in the incidence of diarrhoeal diseases including cholera from 2001 to 2002 with the increase of health awareness. The molecular analysis of the V.cholerae clones by multiplex PCR reveals presence of ctx A and tcp A toxic genes.



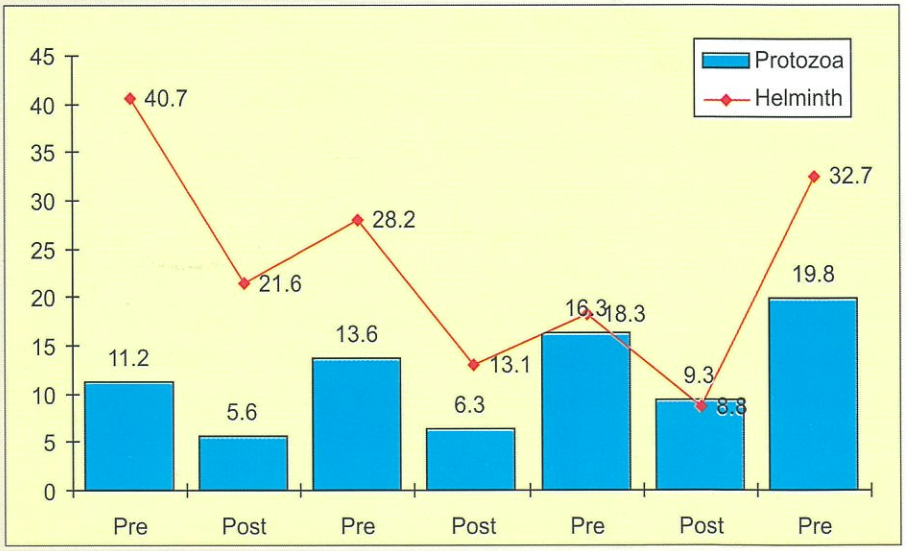
PCR amplification of Ctx A gene in *V. Cholerae*
M : 100 bp ladder, 1 : VC 20 control,
2 4 : test samples

Year wise Situation of cholera in different studied tribes

(Study in K.Kandha has been initiated in 2001 - 2002 and Juanga in 2002 - 2003)



Intestinal parasitism in pre and post follow up study amongst the children (< 14 yrs)
(In Juanga the post intervention study is in progress)



(b) Intestinal parasitism: Microscopic examination of 1329 stool samples amongst 4 primitive tribes from all age and sex groups revealed that 42% of Bondo, 38.3% Didayi, 31.4% Kandha and 33.5% of Juanga are infected with intestinal parasite of both protozoa and helminthes. Amongst the children (0 - 14 years) 42.3%, 32.1%, 25.6% and 25.4% and adult (>14 years) 25.4%, 24.4%, 22.1% and 23.2% in Bondo, Didayi, Kandha and Juanga tribes respectively are infected with helminthic infection. Amongst the helminthic infection, hook worm was found to be the commonest accounting to 19.3% of cases. Amongst the protozoal infection EH was found in 12.4% of samples studied. Repeat stool examination after 4 months of administration of antihelminthic (Albendazole 400 mg single dose for adult / 200 mg single dose for children), and atniprotozoal treatment (metronindazole 400 mg X 3 X 5 days for adult / 200 mg X 3 X 5 days for children) revealed a significant decrease in the worm burden.

(c) Vit A deficiency: The status of Vit A deficiency was re-assessed agewise in 500 Bondo, 516 Didayi, 67 Juanga & 113 Kondha on whom clinical examination was performed earlier.

(d) Scabies: The clinical examination revealed that 19.3% of children and 16.2% of adults had scabies (both infected and non infected) in all the 4 primitive tribes studied. A follow up examination after appropriate intervention (12.5% Benzyl Benzoate emulsion) and personal hygiene revealed marked decrease of scabies (P< 0.001) in different tribes studied.

3.3 Intervention for hereditary common hemolytic disorders among the major tribals of Sundargarh district of Orissa

Status:
Extramural (ICMR Task Force)

Investigators:
Dr.R.S.Balgir
Mr. B.Murmu

Starting date: January 2000
Closing date: December 2004

Aims and Objectives:

1. Screening and identification of major vulnerable tribals, namely, Bhuyan, Munda and Kharia for hemoglobinopathy, thalassemia and G-6-PD deficiency.
2. Sensitisation, motivation and education through audio-visual aids like posters, charts, pamphlets for carrier detection of above genetic conditions.
3. To provide information for prospective and retrospective genetic/marriage counselling to the affected persons.

4. Imparting of relevant training to the state's local health authorities, like lab. technician, health workers, etc.

5. Periodic follow up for evaluation, intervention and clinical management of affected cases through local PHC/hospital.

6. To develop a suitable intervention package for prevention and control of hereditary disorders like hemoglobinopathy, thalassemia, G-6-PD deficiency and Rhesus blood group incompatibility.

Background of the study:

Hereditary hemolytic disorders like sickle cell disease, thalassemia and G-6-PD deficiency are highly prevalent among the tribal populations of India and lead to high degree of anemia, morbidity, mortality and fetal wastage among the vulnerable people. Tribals of Sundargarh district in Orissa, namely Bhuyan, Munda and Kharia are highly prone to hemolytic anemia, jaundice, painful crisis, etc. Since these disorders are hereditary in nature and there is no cure for them, therefore, their prevention in the vulnerable people is highly essential.

Progress of work done:

Last year, we studied Kharia tribal community and found that hemoglobinopathies (13.3%) and G-6-PD deficiency (24.6%) were major public health problems. Both beta-thalassemia trait (6.3%) and sickle cell disorders (5.6%) were common in the community. For the first time, hemoglobin E was encountered in trait and disease form in Delki Kharia community in the district which is quite common in Coastal Orissa, West Bengal and North-Eastern states of India. The enzyme deficiency of G-6-PD was found to be common in males (10.6%) and females in heterozygous (11.2%) and homozygous (2.3%) forms showing high frequency of this genetic problem. However, the usual clinical signs and symptoms like pallor, joint pains, abdominal pains, etc. were observed for these disorders. The frequency of Rhesus negative blood group was very low (1.4%) among the Kharia tribe of Sundargarh district of Orissa.

This year, the work for this project was initiated in Hemgiri Block of Sundargarh district after holding the inter-active meetings with the villagers and village leaders (Sarpanch, Ward members, etc), BDO, CDPO, Anganwadi teacher and local PHC doctor. We selected two villages, namely, Ratansara and Gaddwar belonging to Khandyat Bhuyan and Paraja Bhuyan, respectively in consultation with above authorites. A house-to-house Census was

taken and all the households in the villages were numbered and pedigree drawn. Clinical examination of subjects was done, medicines were distributed to the ailing persons and blood samples were collected for laboratory investigations.

Out of about 1000 target coverage of Bhuyan tribe, 458 persons were screened for sickle cell disease, thalassemia, other hemoglobinopathies, G-6-PD deficiency, and ABO and Rhesus blood groups. Laboratory analysis of 458 blood samples collected from the field was carried out for estimation of total hemoglobin level, Hb A2, fetal hemoglobin and Hb S, hemoglobin electrophoresis, sickling test, G-6-PD enzyme deficiency (DCIP method), etc. Clinical as well as laboratory screening for hemoglobinopathy, thalassemia, G-6-PD deficiency and Rhesus blood groups of Bhuyan community was carried out following standard techniques and procedures.

The results of the study and laboratory analysis are presented as below:

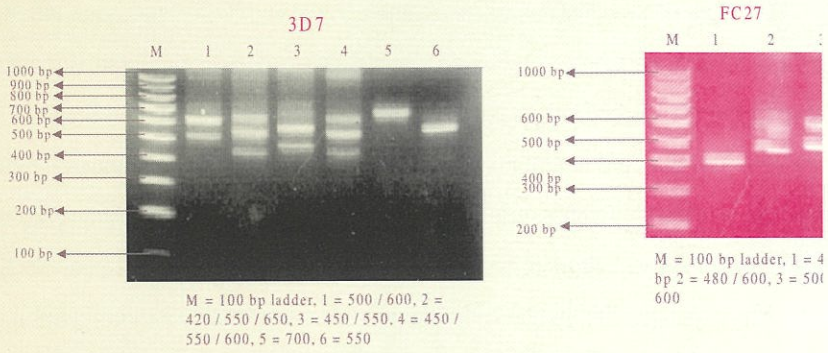
The study showed that hemoglobinopathies (7.9%) and G-6-PD deficiency (19.0%) were major public health problems in Bhuyan tribe of Sundargarh district in Orissa. Both beta-thalassemia trait (10.2%) and sickle cell disorders (4.1%) were common in the community. For the first time, hemoglobin D has been encountered in trait form in Khandyat Bhuyan (1.2%) community in the district which is quite common in Punjab, Gujarat, Maharashtra and Uttar Pradesh in North-Western states of India. Further, for the first time in Orissa, a tribal (Paraja Bhuyan) family was detected having hereditary persistence of fetal hemoglobin (HPFH) in Sundargarh district of Orissa. The enzyme deficiency of G-6-PD was found to be common in males (24.7%) and females in heterozygous (12.3%) and homozygous (1.3%) forms showing high frequency of this genetic problem. However, the usual clinical signs and symptoms like pallor, joint pains, abdominal pains, etc. were observed for these disorders. The frequency of Rhesus negative blood group is very low (0.2%) among the Bhuyan tribe of Sundargarh district of Orissa. In general, among the tribal populations, the frequency of Rhesus negative blood group is low as compared to general populations of India. The preponderance of blood group B over A was found among the tribals of Orissa. The findings of present study are consistent for ABO and Rhesus blood groups in tribal populations of Central India.

The above hemolytic disorders are genetically transmitted and the prevalence of consanguineous marriages is high among the tribal people of India. For G-6-PD deficient

subjects, anti-malarial drugs should be administered taking adequate precautions. Therefore, intervention is highly important for the prevention of these hereditary conditions in the tribal communities.

The knowledge, attitude and practices (KAP) studies among these tribals showed that the people are unaware of the hereditary health problems. About the common health problem according to them were: malaria, cough, cold and asthma (breathlessness). Among the other health problems were: weakness, body ache or joint pains, but they were not aware of the cause of these symptoms. They do not feel any necessity for treatment. However, if the illness persists, they go to local quack and occasionally to PHC doctor for treatment.

Further screening along with sensitisation, motivation for carrier detection and bringing awareness in Paudi Bhuyan tribe is in progress.



M = 100 bp ladder, 1 = 500 / 600, 2 = 420 / 550 / 650, 3 = 450 / 550, 4 = 450 / 550 / 600, 5 = 700, 6 = 550

M = 100 bp ladder, 1 = 4 bp 2 = 480 / 600, 3 = 50 600

FAMILY SPECIFIC ALLELIC FORMS OF MSP 2 GENE

Studies on Nutrition

4

INSIDE

STUDIES ON NUTRITION:

Status:
(Extra-mural-ICMR Task Force)

Investigators:
Dr. G.Bulliyya
Dr.A.S.Kerketta
Mr.P.K.Jangid

Starting date: July 2003
Closing date: Jun 2004

4.1 Study on nutritional status of Dongria Kondh primitive tribe and Domb scheduled caste populations of Orissa.

Objectives:

1. To study demography, socio-economy and morbidity status;
2. To assess the nutritional status of all age groups;
3. To study the household food and nutrient consumption patterns and seasonal variation;
4. To evaluate the availability and utilization of health care and nutritional programmes;
5. To provide nutrition education through existing infrastructure; and
6. To suggest suitable intervention program with particular reference to disadvantaged groups.

Methodology:

The study is proposed to carry out on Dongria Kondh primitive tribe and Domb scheduled caste populations under the Micro-project area of Dongria Kondh Development Agency confined to three revenue blocks in Rayagada district namely Kalyansighpur, Bissam Cuttack and Muniguda. Total populations of these communities inhabits in 112 villages and about 13000 of which nearly 8000 are Dongria Kondhs. Half of the total villages selected adopting block-wise stratification and probability proportionate to size sampling method. All the villages along with population are listed and the cumulative population of the villages computed for each block. The sampling interval calculated by dividing the total population to half of the total number of villages. Random start number was selected between 1 and sampling interval for choosing the first village and by adding the same interval to the random start, remaining 65 villages were selected. All the households belonged to Dongria Kondh and Domb populations in each of the selected are to be included in this study. Further, sample size for each parameter and age group is determined based on prevalence rates.

Work progress:

Pilot field surveys have been conducted in Chattikona area of Bissam Cuttack and Parsali area of Kalyansinghpur blocks. A total of 73 Dongria Kondh and 16 Domb households were studied, which include enumeration of socioeconomic status and utilization of health care services. Finger pricks blood samples were collected on filter paper and smear on glass sliders from 61 individuals for estimation of haemoglobin levels and examination of malaria.

Table 1. Socioeconomic status of study populations

Variable		Dongria Kondh (73)	Domb SC (16)
Type of housing	Kutcha	17.8 (13)	6.3 (1)
	Semi-Pucca	82.2 (60)	93.7 (15
Type family	Nuclear	64.4 (47)	50.0 (8)
	Extended	28.8 (21)	37.5 (6)
	Joint	6.8 (5)	12.5 (2)
Family size	<4 members	20.5 (15)	18.8 (3)
	>4 members	79.5 (58)	81.2 (13)
Illiteracy of head of household		100 (73)	87.5 (14)
Land holding (>one acre)		91.7 (67)	12.5 (2)

4. Studies on Nutrition:

The socioeconomic status of study populations shows that the proportions of households with poor housing condition are more in Dongria Kondhs in comparison to Domb SC populations. The family size and land holding status of Dongria Kondhs is low with high rates of illiteracy to that of Dombs.

Table 2: Distribution of households according to iodine levels in salt samples.

Iodine content (ppm)	Dongria Kondh (73)		Domb SC (16)	
	Number	Percent	Number	Percent
0	71	97.3	8	50.0
7	2	2.7	1	6.2 15
0	0.0	6	37.6	30 0
0.0	1	6.2		

A total of 89 salt samples were collected from households and tested for iodine content using spot-testing kits method compared with the calibrated colour-chart. The proportion of households using salt with recommended levels of iodine (>15 ppm) are negligible in Dongria Kondhs and 43.8% in Dombs.

Table 3. Prevalence of anaemia by haemoglobin levels (g/dL)

Age group	Sample size	Normal	Mildly anaemic	Moderately anaemic	Severely Anaemic
Preschoolers 1-5 y	12	9.8 (6)	8.2 (5)	1.6 (1)	-
School children 6-12y	36	9.8 (6)	16.4 (10)	29.5 (18)	3.2 (2)
Adult females	5	-	-	6.4 (4)	1.6 (1)
Adult males	8	1.6 (1)	4.9 (3)	6.4 (4)	-
Total	61	21.3(13)	29.5(18)	44.3 (27)	4.9 (3)

Anaemia gradation by haemoglobin levels of <11g% for preschoolers and pregnant women, <12% for school-age children, adolescent girls and adult females, and<13% for adolescent boys and adult males

Blood samples were collected from 61 subjects and analyzed for haemoglobin using cyanmethaemoglobin method. Anaemia grading was done as per WHO classification in each age and sex groups separately, however, data for both males and females pooled due to limited sample size. The prevalence of anaemia was 79% while 21% are normal. The proportion of individuals suffering from mild, moderate and severe grades of anaemia were 30%, 45% and 5% respectively. Out of 65 blood smear samples tested for malaria, 10.8% of them were found positive.

4.2. Multicentric study on Determination of loss of iodine in different types of cooking process

ONGOING PROJECT

Investigator:
Dr.G.Bulliyya

Starting date: July 2003
Closing date: April 2004

Funding: Extramural-WHO

Background

Iodine is one of the essential micronutrient required for synthesis of thyroid hormone that plays an important role for normal growth, development. Iodine deficiency disorders continue to be the public health problem in the country. The daily requirement of iodine for an adult is 150ug. The deficiency in consumption of iodine for long period may result in iodine deficiency disorders. Iodine is present in soil and water and its content foods are varies. The stability of iodine present in foods depend on environmental conditions such as temperature

and humidity. The fortification of edible salt with iodine is continued in the country and the degree of iodine loss is a matter of concern to scientific community. The content of iodine of food actually consumed is not necessarily equivalent to that of raw foods since some iodine is lost during cooking. It is ranged from a low of 20% by frying/grilling and as musch as 58% by boiling. In addition, no data are available indicating the loss of iodine in different cooking process adopted in different regions of the country.

The general objective is to study the effect of various cooking methods on iodine content of foods commonly used by different population groups with specific objectives to identification of commonly used food groups (cereals, pulses, vegetables and fruits etc), determination of iodine content in different foods items. This is a multi-centric study covers eastern region of the country that includes Orissa, Bihar, Jarkhand, West Bengal and Northeastern states of Assam, Sikkim and Megalaya. The study investigations includes determination of iodine levels in raw foodstuffs, drinking water sources and in salt samples used in different cooking processes. It involves estimation of iodine in various cooked foods commonly consumed by population groups from the community and its replication in the laboratory using the same cooking procedure. A minimum of 10-15 typical food dishes in each of the state will be chosen for sample analysis. The study is just initiated with recruitment of project staff.

4.3 Intervention programme on nutrional anaemia and Haemoglobinopathies amongst some primitive tribal population of India.

Status :
Multicentric Extramural
(ICMR Task Force)

Investigators :
Dr. G.P. Chhotray

Starting date : October 1999
Closing date : September 2004

This multicentric study was undertaken in 3 primitive tribes of Orissa namely Bondo, Didayi and Juanga with following aims and objectives:

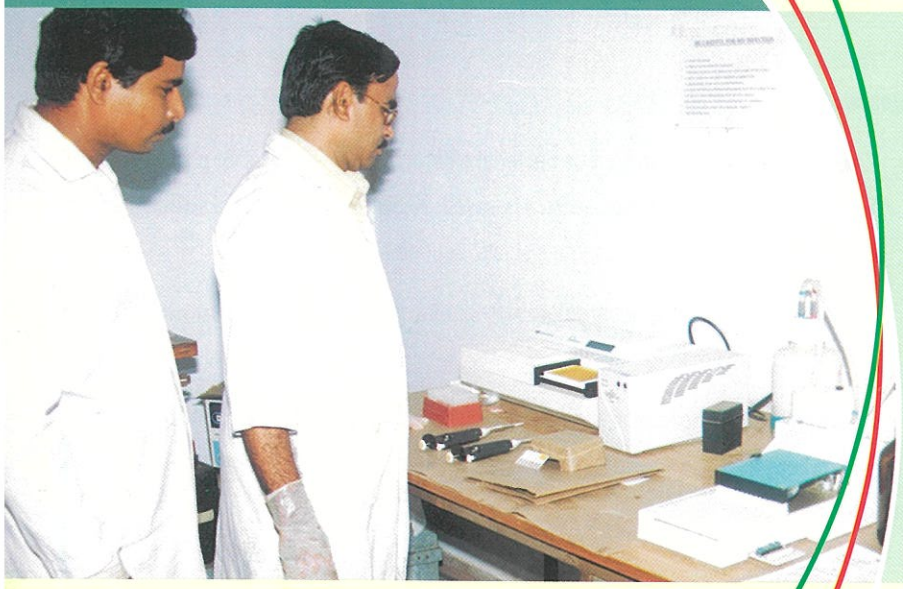
Objectives:

1. To find out the prevalence and aetiology of nutritional anaemia and haemoglobinopathies in four selected primitive tirbes Bondo, Didayi, Juanga & Kondha.
2. Clinical evaluation, management and monitoring of detected cases of anaemia and Haemoglobinopathies
3. To provide necessary supplementary intervention programme for formulating the future strategies of education and training to the Doctors at the PHC level.

During the period under report (April 2002 - March 2003), a detailed clinical examination and laboratory investigation on 1329 individuals belonging to Bondo (141) Didayi (363) Juanga (511) and Kandha (314) primitive tribes of Orissa has been performed. Based on their haemoglobin level, 47% of the studied population (41.3% Bondo, 39% Didayi, 49.5% in Juanga and 50.8% in Kondha) were found to be normal and 53% were having clinical signs / symptoms of anaemia. Taking WHO guidelines, it was observed that 25 out of 1329 total studied population (1.9%) were suffering from severe anaemia (< 7 g / dl), 535 (40.3%) had mild anaemia (9 - 11 g / dl), and 143 (10.8%) had moderate anaemia (7 - 9 g / dl). Various laboratory investigation and haematological test revealed that 56% of the anaemic cases had microcytic hypo chromic blood picture indicating iron deficiency anaemia. Amongst the various hereditary haematoglocal disorders detected during the study sickle cell disease was observed in 1.8% of cases. Haemoglobinopathy in form b thalassaemia in 2% cases and G6PD deficiency 2.3% cases among the studied population.

Appropriate intervention and follow up studies of cases revealed that, there is an improvement in haemoglobin status in 26.3, 24.2, 23.8 and 27.4% of the cases of anaemia in Bondo, Didayi, Juanga and Kandha population respectively.

Surveillance



5

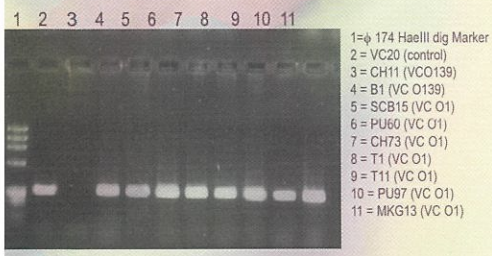
INSIDE

SURVEILLANCE

Status:
Intramural

Investigators:
Dr.B.B.Pal
Dr.G.P.Chhotray
H.K.Khuntia

Starting date: 2002
Closing date: Continuing



CTX A gene of Vibrio cholerae O 1 & O 139

5.1 Bacteriological analysis of enteropathogens causing diarrhoeal disorders reported from coastal districts of Orissa.

Objectives:

1. To isolate and identify the various bacterial enteropathogens like Vibrio cholerae, E.coli, Salmonella and Shigella species from hospitalised diarrhoea patients of selected coastal districts of Orissa (Puri and Khurda districts) periodically.
2. To isolate and identify bacterial enteropathogens from the outbreak investigation reported from time to time.
3. Strain typing of bacterial enteropathogens by specific antisera and their antibio-gram.

Background information:

Besides epidemics of diarrhoeal disorders reported following natural disasters, the state frequently reports focal outbreaks from coastal districts. Earlier reports from this centre has shown that diarrhoea associated with the bacterial enteropathogens are endemic in coastal districts. In collaboration with NICED, Kolkata we have established the diagnostic facility of Vibrio cholerae and strain typing and molecular analysis. To ascertain the cause of diarrhoea and its strain frequently reported from coastal regions of Orissa, diarrhoea surveillance was undertaken following the standard protocol in hospitilised cases in some hospitals of Puri and Khurda districts. Besides, during major diarrhoeal outbreaks, the pathogens were also isolated and reported.

Monthly surveillance activity with state health department (public health) included collection of rectal swabs from cases admitted to diarrhoeal ward of hospitals on day of visit, transportation by appropriate medium to lab, bacteriological analysis and early reporting to state public health department. Besides the strains are also further analysed using molecular markers in the lab.

Progress:

Rectal swabs were collected from the diarrhoeal cases admitted to Capital hospital (Khurda district) and Pipili CHC, Balanga CHC and ID hospital (Puri district) on day of visit to hospitals fortnightly for one year (June 2002 to May 2003). During peak season, the collection was done weekly. Monthly average number of rectal swabs collection in Khurda and Puri district are 12 and 20 respectively. In total 464 nos. of rectal swabs were collected from the both the districts and tested. Diagnosis of causative bacterial enteropathogen was done by culture and serology following standard techniques. A combination of 3 media like TCBS

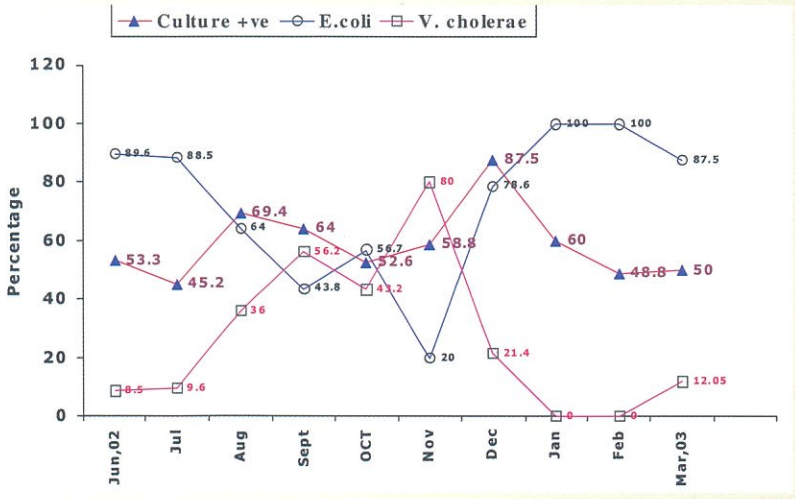
(ThioSulphate Bile Sucrose), MacConkey and HEA (Hekteon Enteric) agar plates were used for the isolation E.Coli, V.Cholerae, Salmonella and Shigella sp.

Out of 464 samples rectal swabs tested 258 (55.6%) are found culture positive of which E.Coli were 194 (75.2%), V.Cholerae were 61 (23.6%) followed by Shigella sp. 3 (Shigella flexineri type - 6, 1.2%) (Table 1)

Bacteriological analysis of stool/rectal swabs collected from June 2002 to March 2003

Total sample collected: 464	
Culture positive:	258(55.6%)
E.coli:	194(75.2%)
V.cholerae:	61(23.6%)
01:	52(20.1%)
0139:	9(3.5%)
Shigella species:	3(1.2%)
Culture negative:	206(44.4%)

Age group distribution of diarrhoeal cases tested culture positive indicated adult predominance. Distribution pattern of culture positive cases in both the districts for 12 months indicated highest frequency or peak during July to August and also during the post monsoon season. Isolation of V.Cholerae was made almost through out the year from samples collected from ID hospital, Puri. Puri ID hospital reported highest no. of V.Choleare infection. Inorder to know the source of infection addresses of the cases were collected from the ID hospital. It was found that the some positive cases for V.cholerae were reported almost every month from Penthakata slum area of Puri town mostly inhabitated by fishermen. This area was having total population of around 50 thousand and environment was purely unhygienic.



Monthwise culture positive cases (%) for different enteropathogens (June, 02-Mar,03)

All the V.choleraeO1 isolated during this period were sensitive to ciprofloxacin, norfloxacin, gentamycin, tetracycline, chloroemphicol, and resistant to ampicillin, furazolidone, nalidixic acid, where as V.cholerae O139 were sensitive to ciprofloxacin, norfloxacin and resistant to neomycin, ampicillin. Effort was made to identify the source of infection. Molecular analysis of strains are in progress.

Outbreak investigation:

Besides regular surveillance, two diarrhoeal outbreaks were investigated. During the last week of August, 2002 there was an outbreak of diarrhoeal disorder reported from Badipanka and Tanema village of Mohana area, Gajapati district. The team investigated the outbreak. The team visited the affected households, obtained the history of episode and collected the rectal swabs from the diarrhoea cases (n = 12) admitted to hospitals as well as from household cases. Out of 12 samples tested 11 were culture positive and V.choleare from 5 samples. The causative organism of this outbreak was found to be V.cholerae O1 ogawa, biotype El Tor. The index case was found to be an adult female who was suffering from diarrhoea after consuming the grand feast . About 20 people were later got infected with diarrhoea and were hospitalised in Mohana CHC; .All were treated with IV drip with antibiotic ciprofloxacin / norfloxacin and metronidazole. The report was submitted to the concerned health authorities and the outbreak was controlled.

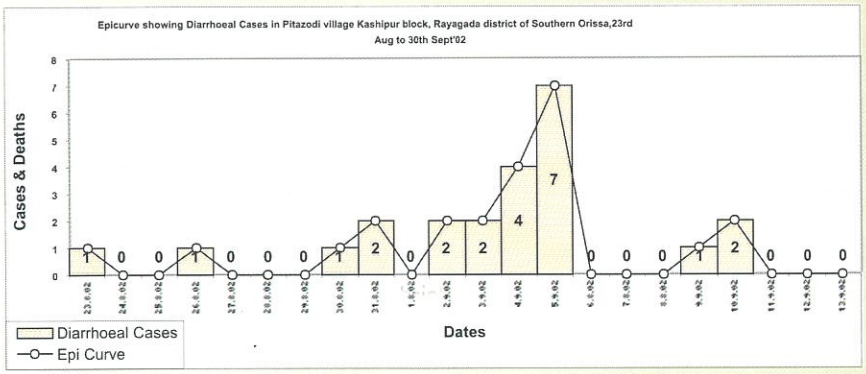
The team also visited the Pitajodi village of Kasipur block of Rayagada district on report of diarrhoea outbreak during the month of September 2002. This village is located in the hilltop and it is away from main town of Kashipur.In this village there was panic in last year due to mango cornel death reported from this village. The people mainly depend upon the stream water for their house hold use. The village is having 480 population under Tikiri G.P.dominated by ST population. During our visit some diarrhoea patient were being treated at the nearby PHC. Information on month wise attacks and deaths of diarrhoea patients from this village were collected from house to house survey. The incidence rate of diarrhoea cases among all age groups in Pitazodi village during the period 17.08.2002 to 13.09.2002 was 23´480´1000=47.9/1000 population.Similarity, the case fatality rate of diarrhoea cases among all age groups was /23´100=13.04%.

The patients had complaints of profuse watery diarrhoea with abdominal cramp vomiting and severe dehydration .The patients were responding to treatment with ciprofloxacin

/ norfloxacin, tetracycline and metronidazole given by local health authorities. The causative organism of this outbreak was V. cholerae O1 ogawa, biotype El Tor .All the V.cholerae isolated from these above outbreaks were sensitive to ciprofloxacin, norfloxacin, tetracycline, chloramphenicol and resistant to nalidixic acid ,ampicillin , neomycin and furazolidone. The furazolidone was earlier used as drug of choice for the paediatric age group for diarrhoeal outbreaks.

Outbreak confirmation:

From the last five-years data it is found that there was no such increase in number of diarrhoea cases in Pitazodi village during the month of August and September. The spot map shows clustering of cases with epidemiological link. This is clearly indicating that it was an outbreak of diarrhoeal illness in Pitazodi of Tikiri G, P of Kashipur Block of Rayagada district during 3rd week of August to 2nd week of September, 2002.



Immediate health intervention done:

1. During our surveillance the patients were treated with ORS and antibiotics like tetracycline, metronidazole to adult and furazolidone to under five year chieldren. The health workers were instructed to chlorinate the drinking water sources on the next day and to continue it minimum twice a week for one month.
2. We discussed regarding the present situation with the medical officer of Kashipur CHC and the potential danger of diarrhoeal outbreak in Gorakhpur GP and nearby areas Suggestion was given for continous active surveillance in Pitazodi village and nearby villages of Gorakhpur and Tikiri Gram panchayats respectively for regular chlorination of drinking water sources.

Status:
Intramural

Investigators:
Dr.G.P.Chhotray
Dr.B.B.Pal
Mr.A.K.Khuntia

Starting year: 1987
Closing date: March 2003

5.2 Sero-surveillance of HIV infection in Orissa:

Objective:

1. To evaluate the trend of HIV infection in high risk group population such as TB patients drug addicts and haemophilias etc.attending various hospitals and clinics.

This year 184 serum samples were collected from different risk group of cases and were screened for HIV infection. Only 18 were found positives (9.8%) for HIV. . Out of 184 cases, 113 had to tuberculosis of which 5 were confirmed for HIV infection .Out 5 HIV positive patients one was infected with both HIV-1 and HIV-2 viruses. This is the first report of mixed infection of HIV-1 and HIV-2 viruses from TB patients from this state. This year the sero positivity rate has increased upto 8.9/1000 samples screened in comparison to 6.84/1000 sample screened in the previous year.

Besides surveillance activity, the centre has taken up collaborative work on subtyping of AIDS in collaboration with state AIDS Cell, Orissa and NARI, Pune, to type the HIV strain prevalent in the state in a multicentric study, coordinated by NARI. Blood samples from 20 confirmed HIV positive cases will be are being processed to separate their PBMC, extract the nuclear DNA and will be sent to NARI for PCR diagnosis of HIV strain typing.

Other Scientific Studies/Report

6

INSIDE

OTHER SCIENTIFIC STUDIES/REPORTS

Investigator:
Dr. S. K. Das

6.1. Activities of NNMB Unit, Orissa, Bhubaneswar

The NNMB Unit, Orissa under NIN, Hyderabad functioning at RMRC, Bhubaneswar has undertaken Micro-Nutrient Deficiency Survey in rural population of Orissa from November'2001. Eighty (80) villages in sixteen (16) districts of Orissa are included in this survey. The assessment includes examination of pre-school children i.e. 1 to 4 yrs. for sign of Vit-A deficiency, 6-11 yrs for signs of IDD and 1-4 yrs. children, 12-14 yrs. adolescent girls, 15-17 yrs. adolescent girls, women having >6 months pregnancy, lactating women having < 6 months children for signs of Iron deficiency anaemia. Estimation of hemoglobin is done among above mentioned vulnerable groups by cyano-methaemoglobin method. The work has been completed and data are regularly sent to NIN, Hyderabad for analysis.

The unit had also conducted RCH training programme during April'2002 to train participants from Bihar & Jharkhand, N-E-States and Orissa.

Special Nutrition Survey in starvation prone block, Kashipur of Rayagada district of Orissa has been conducted by RMRC-NNMB during May'2002 in collaboration with NIE, Chennai.

6.2 Evaluation report on "Impact of medicated bed net for control of malaria in Ghatagaon PHC, Keonjhar, Orissa".

Investigators:
Dr.Namita Mohapatra
Dr. A. Mohapatra
Dr. R.K.Hazra
Dr.S.K. Parida

Background:

Nearly half of all malaria deaths in India occur in the state of Orissa. The major proportion of deaths is due to high prevalence of falciparum malaria, especially in the tribal areas, where the people are less likely to seek medical care. Keonjhar is one of the districts of Orissa, which consistently had the highest reported incidence of malaria. It is one of the districts with Annual Parasite Index (API) of over 20.

Ten Thousand impregnated Bed nets (10,000) were distributed in 41 villages, of 7 Gram Panchayats, in Ghatagaon PHC/Block of Koenjhar district, of Orissa during Jan 2000 by state health department. Besides this icon spray was also carried out by the PHC in all villages of Ghatgaon PHC in Mar 2000. With the request from the State Government of Orissa, Regional Medical Research Centre, Bhubaneswar, carried out an evaluation with a team of experts during Jan 2003.

Sampling: 41 villages in two health sectors is the area of MMN distribution, spread over in 7 village panchayats. The number of Villages in each Panchayat ranges from 3 to 10 per Panchayat. Out of all 7 panchayats the number of villages taken in to study ranged from 2-8 in number, thus covering total 30 villages for evaluation.

Following World Bank MMN evaluation standard guidelines for MMN evaluation, 9 people were covered for in-depth questionnaire, from each unit villages visited. Using Inter Personal Communication (IPC) skill i.e. through interaction 9 people (of either sex) (3 school going age children, 3 women, 3 men) with supply of bed-net and 2 people with out

nets in each village were selected randomly for comparison as control. In total there were 270 respondents who have received bed-nets and 60 people who could not buy / did not get bed-nets, thus in total 330 respondents were interviewed from these selected 30 villages Table-1.

For entomological evaluation 23 villages were selected from 7 gram Panchayat where MMN were distributed and to compare the data 5 control villages were selected from the same Eco type. From each village minimum 10% households were selected randomly following the standard procedure for mosquito collection & analysis.

Mode of distribution of MMN in the village:

Ten thousand medicated mosquito nets (10,000) were distributed through the village Panchayat members, at a price in the range of Rs.20 - Rs.50.00 Tab-5. This price difference is due to economic class difference like BPL, APL etc. Randomly the Panchayat member allotted one (54%), two (33%) or three (11%) MMN per house depending on his own will. To some houses no MMN was given, and there were houses that could not buy, due to financial constraints. However, there were no records available, to this effect.

Social Marketing:

The concept of Social Marketing is to create a stakeholder ship in the mind of the community members, as a partner to the programme. A token money as fixed by the community is charged, for that purpose. In this regard proper Advocacy, & IEC has to be disseminated in the target area. However, it was observed, that the concept of social marketing was not clear with the villagers. They have understood that Rs.20 -50.00 is the subsidized price of the nets like other supply commodities rice/kerosene/sugar etc; Instead of understanding the process of social marketing and stakeholder ship concept. Peoples' participation and social marketing concept was not achieved in the study area due to lack of proper IEC on MMN.

Re-impregnation of MMN:

Re-impregnation of MMN after an interval of six months is recommended. In this study area, re-impregnation of bed nets were neither carried out nor planned. There was no provision for the Synthetic pyrethroid -Flow for supply by NAMP after 6 months of net use mode. Besides this, the State / District Malaria Officer cannot buy the chemicals/ flow, as per the guidelines. Hence, 6- monthly re-impregnation could not be undertaken or even planned.

Reaction of MMN if any:

During the initial use of net mild reactions were reported. They were headache-(6.3%), of them had cough & cold (20.7%); Itching in the skin (30.4%) of cases. At the same time 42.6% of them reported that it is safe, i.e. they did not have any reaction. Washing of MMN was reported within 6 months in 22.6% cases and within 6-12 months in 68.9% of cases.

Perceived Benefit Of MMN:

MMN distribution in Ghatgoan block of Koenjhar district of Orissa was having a high degree (91.8%) of positive perceived benefit, in the community. That is People have experienced its effectiveness in mosquito control and malaria control too. However, side by side its' effect on other insects and even on wall lizards too (as reported) was very effective. The effectiveness of bed-net in terms of control of household insects / fly's were well reported by the people in the study area. That is why almost 80% of the respondents were ready to buy more MMNs if supplied in future. They are even ready to re-medicate their nets. The Knowledge or KAP level of the population is poor, as 15% advocate for chloroquine consumption and 35% advocate for use of bed net in malaria control. It is observed that people did not have the habit of using the bed nets, in the past. However, after supply of the MMN, the percentage of user habit has increased. It is encouraging to note all the respondents of the households where there is no bed net was distributed were also eager to buy next time; this reveals a positive attitude of the community.

Knowledge, Attitude & Practice On Malaria:

Knowledge, Attitude, Belief & Practices (KABP) of a community is the backbone of the Health Culture of any community. In this evaluation, it emerged that, around 35% of the respondents knew about the benefits / relation of the mosquito net and malaria. Around 15% of the respondents were aware of chloroquine tablets & its relation with malaria; there was no difference observed between houses with bed net & without bed net. Fifteen percent (15%) of the respondents had mentioned to take advice / consult the heath staff and the rest answers are hopeless (Tab-10). Around one third of the respondents new about the fact that, mosquito is the causative vector Tab-10. People were aware of the preventive practices prevailing in the community right from use of mosquito net, fumigation / smoging, use of coil, oil and all other repellents etc. Tab-10 (c), but they do not use it daily, except when the mosquito nuisance is more. In this area Sal tree leaf and rice husk smoke is believed to keep away mosquitoes and are used.

Entomological evaluation:

There was no base line entomological data available for comparing the efficacy of the bed nets on vector. This survey only revealed the current situation of the vector density and efficacy of the bed net. Adult collection reveals the presence of three genus of mosquitoes with six species of mosquitoes including three vectors (An.annularis, An. culicifacies, and An.varuna) in both control and MMN treated villages. An fluviatilis was found in the control villages(Table E- 1). Though the current situation shows the PMHD of Anopheles annularis is 11.8 compared to the control village 20.6 but it need at least three point survey during three seasons (Rainy, Winter and Summer) for comparison to conclude. The susceptibility test of An.annularis to different insecticides reveals it is susceptible to DDT, Malathion and Deltamethrine. (Table E- 2) Bioassay test conducted on the supplied impregnated bed net

shows that there is no effect. (Table E -3). One hundred thirty-five Anophelines were dissected to see gut and gland infection, none found positive (Table E-4) some mosquitoes were brought to the laboratory to see its infectivity by PCR method.

Summary of the evaluation:

The malaria situation of the area from available data from state health reveals that there was a decreasing trend of prevalence of malaria over the years from 1999 to 2002Nov. However, the mortality figures are not conclusive.

The current situation shows the PMHD of Anopheles annularis is low compared to the control village but it needs at least three-point survey during three seasons (Rainy, Winter and Summer) for comparison.

The community's perceived benefit response indicated increased awareness with an encouraging idea about the effectiveness of MNN, in the past; this is only a qualitative picture.

The distribution of MMN has increased the use of bed net in the community reflects their changed behaviour pattern in prophylactic use against malaria.

The number of users in each household is not considered while distributing the MMN. The MMN distribution should have covered all members of each household.

From the above report it emerged that, since re-impregnation of MMN was not carried out in the area, after six months of distribution of impregnated bednets. Hence, effect of bednets for the Control of Malaria - an evaluation after a gap of 3 years was not expected to provide desired result of intervention, used as prophylaxis. Hence, it is recommended to plan for re-impregnation in time periodically, in future action plans.

In malaria control programme, entomological parameters (vector bionomics like vector density, resting and feeding behaviour, susceptibility status etc.) play a great role. Therefore, it is necessary to have the baseline information on vector density and their bionomics before implementation that should be monitored periodically after intervention. This data could have helped to compare the efficacy values taken at end point.

6.3. Micro-epidemiological Stratification of Malaria: For identification of the high-risk districts in Orissa

Investigator:
Dr.A.Mohapatra.

Malaria has always been rated as a major public health problem in Orissa, jeopardizing all the developmental activities of the State on account of heavy morbidity and mortality due to malaria. Malaria presents a complex phenomenon, combined along with its environment and socio-cultural behavioural practices, of the population in a locality. That is why malaria is a local & focal problem. At the same time the dynamics of the disease keeps on changing depending on various local condition and population movements etc.

Hence Malaria control becomes difficult, time taking with heavy financial burden. To over come this aspect one has to Identify the malaria prone areas - I.e. High Risk areas, concentrate in these areas, so to get the best results with the available resources and men-power.

Therefore, under these dynamics it is desirable to identify the high-risk districts / areas & concentrate the anti-malarial efforts in these districts / areas to achieve the results with minimum time and resources. At the present juncture, indiscriminate use of anti malarial and insecticides will increase the incidence of drug resistance in the population and insecticidal resistance among the vector population in the State.

Since Orissa State is contributing 50% of the malarial death burden of the country. The tribal population of the State is almost one forth of the total population. It has many mountain ranges and almost 40% of the total area is under forest cover. Almost 25.8% of the arable land area is under irrigation. The urban population increasing day by day with more and more constructions coming up and other developmental activities of the state has also increased many folds due to the efforts of World Bank, Unicef and IMF etc. AS a result all the ecotypes of malaria like Forest malaria, urban malaria, Irrigation malaria & others etc. are represented with in the state in an interweaving fashion. Even the boarder malaria is suspected to be dominating in the bordering districts such as Nuapada, Koraput, Malkangiri etc. as per the recent reports of Regional Medical Research Centre, Bhubaneswar.

Therefore R.M.R.C. (ICMR), Bhubaneswar, has made an attempt to identify the High Risk Districts in the first phase. Later on gradually the High Risk PHCs and Subcentres will be identified in the second phase, gradually.

Methodology:

For this purpose the standard procedure followed by NAMP for its WHO project protocol is being followed. In this the parameters like Topography, Rain fall, Vector prevalent in the area, Average API/SPR of last 5 years, Epidemic Potential & Vulnerability etc. are being scaled and weight scoring has been followed. Following this scale in the first phase all the 30 districts data on these parameters is pulled and tabulated. The averages are being calculated and scored for the weight in accordance to the scale.

Summary and conclusion:

Out of 30 districts of Orissa 24 are under very very high risk, 2 are under high risk and rest 4 are moderately under risk of malaria.

MICRO-STRATIFICATION OF MALARIA HIGH-RISK AREA

DISTRICTS	Avg. Rainfall	WT	Avg. API	WT	Avg. SPR	WT	TOPO. WT	MIGR. WT	HIGH API (w)	Vector WT	TOTAL WT	STRTUM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)	(9)	(10)	(11)
BALASORE	176.1	6	2.40	4	7.56	4	0.5	2	2	4	22.5	IV
BHADRAK	132.23	4	0.7	1	0.87	0	0.5	2	0	4	11.5	II
BOLANGIR	88.95	2	16.75	8	12.42	6	6	0	8	8	38	V
SONEPUR	104.62	4	17.24	8	11.46	6	3	0	8	8	37	V
CUTTACK	141.34	4	1.51	2	2.74	2	5	4	0	4	21	IV
JAGATSINGHPUR	147.65	4	0.18	1	0.77	0	5	2	0	4	16	III
JAJAPUR	151.32	6	3.35	4	6.66	4	5	2	4	4	29	V
KENDRAPADA	140.64	4	0.45	1	0.90	0	0.5	2	0	4	11.5	II
DHENKANAL	129.90	4	21.14	10	17.16	6	6	4	2	8	40	V
ANGUL	111.40	4	12.81	8	18.66	6	6	4	6	8	42	V
GANGAM	119.90	4	5.16	6	8.88	4	3	4	4	8	33	V
GAJAPATI	115.44	4	23.18	10	13.89	6	6	2	8	8	44	V
KALAHANDI	120.91	4	17.59	8	12.09	6	6	2	8	8	42	V
NUAPADA	97.08	2	48.94	10	36.97	8	6	2	10	8	46	V
KEONJHAR	130.27	4	27.56	10	17.32	6	6	2	8	8	44	V
KORAPUT	137.5	4	17.30	8	12.76	6	6	2	8	8	42	V
MALKANGIRI	148.52	4	29.87	10	12.48	6	6	2	8	8	44	V
NAWARANGPUR	132.18	4	12.50	8	10.67	6	6	0	8	8	40	V
RAYAGADA	102.87	4	23.95	10	14.52	6	6	4	8	8	46	V
MAYURBHANJ	140.10	4	13.64	8	9.82	4	6	2	8	8	40	V
PHULBANI	137.31	4	53.74	10	17.12	6	6	2	10	8	46	V
BOUDH	96.06	2	8.54	6	14.09	6	6	2	6	8	36	V
PURI	140.25	4	0.31	1	0.79	0	0.5	4	0	4	13.5	II
KHURDA	139.72	4	2.22	4	5.96	4	3	4	2	8	29	V
NAYAGARH	116.04	4	6.27	6	10.67	6	3	4	4	8	35	V
SAMBALPUR	102.97	4	19.53	8	12.18	6	6	4	8	8	44	V
BARAGARH	108.4	4	9.84	6	9.66	4	6	2	6	8	36	V
DEOGARH	137.88	4	36.73	10	14.40	6	6	2	10	8	46	V
JHARSUGUDA	99.03	2	8.08	6	9.59	4	6	2	6	8	34	V
SUNDARGARH	124.90	4	38.67	10	15.10	6	6	4	10	8	48	V

Sources: DHS, Orissa, Meteorology Dept. ; Compiled at: Epidemiology Division, RMRC (ICMR), Bhubaneswar.

Medical Research Centre, Bhubaneswar made a detailed plan and visited the following districts almost every month, in order to monitor the malaria situation. The districts so far visited are Kandhamal, Nuapada, Kalahandi, Sonepur, Bolangir, Malkangiri and Rayagada of KBK region.

A district level meeting with the district Collector along with the CDMO & District Malaria Officer is held. The districts epidemiological situation is analysed and presented. In the district two high risk PHCs were selected and furtherer from the PHC two sub centres were identified. From these subcentres 2to 3 villages were selected and visits were made randomly. In the village at central clinic all the reported fever cases were screened and slides were collected, besides that a on the spot para-check-pf was also carried out. The IRS if ongoing is verified along with the PHC -MO. The stock of anti malaria tablets and IRS chemicals and bed nets if there were also verified and suggestion are made, how to go for IRS, net distribution and para-check distribution in the field as per the data of the PHC and endemicity of the areas. During these visits the EDPT-early diagnosis and prompt treatment aspect is stressed. The DDC/FTD were also visited.

Services

7

INSIDE

Investigators:

Dr. R.S.Balgir

Dr. G.P.Chhotray

Dr. M.R.Ranjit

Dr. B.P.Dash

Mr. B.N. Sethi

Mr. K.C. Dalai

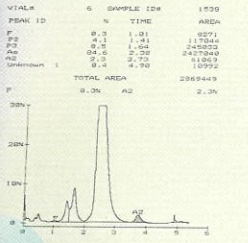
Mr. B.K. Kanhar

7.1 Referral diagnostic services on hereditary haematological disorders

Objectives:

Referral services were undertaken to establish the diagnosis of various hereditary haematological disorders referred from various peripheral hospitals and medical colleges of the state and to undertake analysis of the diseased cases for research benefits.

In one series, 57 cases (30 male and 27 female) were referred from various medical colleges and peripheral hospitals of the state for investigation and confirmation of diagnosis for various hereditary haematological disorders. Most of the referred cases were having complains of refractory anaemia, progressive weakness and jaundice. Out of 57 cases, 49 belong to general category, 5 to scheduled caste and 3 to scheduled tribe. A detailed clinical examination and laboratory investigation such as haematological profile by automated cell counter (MS9), quantitative analysis of Hb, HbA2, HbF and its electrophoresis was carried out by established methods. Out of total 57 cases 38.5% (n = 22) were found to be electrophoretically normal (HbAA), 19.3% (n = 11) sickle trait (HbAS), 7.0% (n = 4) sickle disease (HbSS), 3.5% (n = 2) sickle - b thal (HbS - b thal), 5.3% (n = 3) b thalassaemia major (b thal major) and 26.3% (n = 15) b thalassaemia trait (b thal trait). While analysing, the community wise distribution of the disorder, it was observed that the hereditary haematological disorder was more prevalent among the general category patients compared to SC and ST patients, Table 1. Further molecular analysis revealed the presence of IVS 1 - 5 (G -> C) mutation in all cases of b thalassemia.



Chromatogram of normal Haemoglobin

ANALYSIS BY HAEMOGLOBIN VARIANT ANALYSER

Table 1.

Category	Total	AA	AS	SS	S-b	b-?thal major	b--thal trait
General	49	19 (38.7)	9 (18.4)	3(6.1)	2(4.1)	2(4.1)	14(28.6)
SC	15	2 (40.0)	1 (20.0)		0	1(20.0)	1(20.0)
ST	3	1(33.3)	1 (33.3)	1 (33.3)	0	0	0
Total	57	22(38.5)	11 (19.3)	4 (7.0)	2(3.5)	3(5.3)	15(26.3)

In another series diagnostic services were provided to 62 families referred during the period from April 2002 to March 2003, for electrophoresis, a total of 108 subjects were screened. Out of 108 cases, 7 (6.5%) were diagnosed as homozygous sickle cell disease, 1 (0.9%) sickle cell-beta-thalassemia, 18 (16.7%) sickle cell trait; 3 (2.8%) Beta-thalassemia Major, 27 (25.0%) Beta- thalassemia trait; 1 (0.9%) Hb AD and 51 (47.2%) cases were found normal. Of the 108 cases, 16 (25.8%) belong to Khandyat caste, followed by Brahmin (12.9%), Chasa (9.7%), Gauda (6.4%), Kondh (4.8%), Dom, Dhoba, Gudia, Carpenter, Oraon, Muslim and so on in the decreasing order.

7.2 Referral diagnostic services for malaria

Investigator:
Dr. S.S.S. Mohaptra
Dr. A.S. Kerketta

The fever cases from different Govt. hospitals are referred to RMRC for malaria, microscopic examination. In one year, 132 cases have been referred of which 91 males were and 41 females. Out of 132 slides examined 19 slides found to be positive for malaria parasite. Of which were identified as P. falciparum, 11 were P. vivax and 1 was with mixed infection.

7.3. OPD services on Filariasis:

Investigator:
Dr. A.S. Kerketta

RMRC provided OPD care and treated filariasis cases twice a week at Capital Hospital, Bhubaneswar. During the period of reporting a total of 801 new cases were examined clinically, treated and investigated for the presence of filarial infection by doing test for circulating filarial antigen (CFA). Out of this 132(16.5%) with acute filarial and 516 (66.4%) with chronic symptoms of filarial were detected (Table 1). Blood samples were examined in 654 cases and from that 81 (12.4%) were positive for CFA. A total of 24 patients with different grades of lymphoedema were given intermittent decompression therapy (DT) for one hour. A special care for maintenance of proper hygiene of the limb was demonstrated and advised. The cases are being followed-up in OPD for any reversibility of oedema and to assess any reduction in the occurrence of adenolymphangitis (ADL).

Table.1: The details of the OPD cases

CLINICAL DIAGNOSIS	Number (%) 2002-2003
Acute filaria:	
Adenolymphangitis (ADL)	63 (7.9)
Lymphangitis (LNG) + Lymphadenitis (LND)	60 (7.5)
Orchitis	8(1)
Funiculitis	1 (0.1)
Chronic filaria:	
Lymphoedema Grade-I	330(41.2)
Lymphoedema Grade-II	79(9.9)
Lymphoedema Grade-III	25(3.1)
Chronic filarial cases with secondary infection(ADL)	41 (5.1)
Hydrocele	13 (1.6)
Nodule	28 (3.5)
Other* ailments	154 (19.1)
Total	801

* (Backache, Arthritis, Traumatic Arthritis, Planterfasciatis, Myalgia, Neuralgia, Cellulitis, TPE, Chyluria).

Investigator:
Dr.A.Mohapatra

(Confirming Malaria in field)

7.4 Monitoring of Anti-malaria Programme in High Risk Districts of Orissa

Following the visit of Union Health & Family Welfare secretary to Orissa, Regional Medical Research Centre, Bhubaneswar made a detailed plan and visited the following districts almost every month, in order to monitor the malaria situation. The districts so far visited are Kandhamal, Nuapada, Kalahandi, Sonepur, Bolangir, Malkangiri and Rayagada of KBK region.

A district level meeting with the district Collector along with the CDMO & District Malaria Officer is held. The districts epidemiological situation is analysed and presented. In the district two high risk PHCs were selected and furtherer from the PHC two sub centres were identified. From these subcentres 2to 3 villages were selected and visits were made randomly. In the village at central clinic all the reported fever cases were screened and slides were collected, besides that a on the spot para-check-pf was also carried out. The IRS if ongoing is verified along with the PHC -MO. The stock of anti malaria tablets and IRS chemicals and bed nets if there were also verified and suggestion are made, how to go for IRS, net distribution and para-check distribution in the field as per the data of the PHC and endemicity of the areas. During these visits the EDPT-early diagnosis and prompt treatment aspect is stressed. The DDC/FTD were also visited.

Completed Project

8

INSIDE

Status:
Extramural (WHO/TDR)

Investigators:
Dr. B.V. Babu
Dr. G.P. Chhottray
Dr. R.K. Hazra

Starting date: September 2001
Closing date: October 2002

8.1 Advocacy for sustained treatment compliance of Lymphatic Filariasis control in Orissa, India (WHO/TDR Supported)

Objectives:

(1) To determine the reasons why individuals may or may not comply with the lymphatic filariasis treatment in mass drug distribution.

(2) To determine reasons at the village and community levels for the coverage/compliance levels attained.

(3) To identify the factors at health facility level that effect coverage/compliance.

(4) To document the factors that may influence coverage/compliance at the district level.

(5) To identify the factors at state levels that may affect coverage/compliance.

Programme to eliminate lymphatic filariasis in Orissa

Of the 30 districts of Orissa, four districts namely, Khurda, Puri, Balasore and Ganjam have been selected by the state health department for implementation of MDA of DEC and albendazole. A strategy for communication and behavioural impact (COMBI) has been implemented along with MDA with the financial and technical assistance of WHO. Under the COMBI, the strategy has been implemented (intense COMBI) in two districts, i.e., Khurda and Ganjam districts, while in remaining districts COMBI has been implemented moderately with a fewer activities. The distribution took place on 27th January 2002 and following two days as mop-up days. Children below two years, pregnant women and persons who are seriously ill were excluded from the programme.

Study Area, Sampling and Data:

The evaluation studies were conducted in four districts namely, Khurda, Puri, Balasore and Ganjam of Orissa state, where the mass drug administration has been taken place. Both quantitative and qualitative surveys have been undertaken to address various issues of the programme. The sampling units (clusters of households) are taken based on (1) urban / rural, and (2) type of or absence of health facility. From each district, 20 clusters (2 villages with primary health centre, 4 villages with health sub-centre, 8 villages with no health facility and 6 urban wards) are taken for household coverage survey. From each cluster, a minimum of 20 households was selected randomly from five random points. Care has been taken to include men and women, proportionately. Household coverage survey has been undertaken to assess the coverage and compliance, and other issues of compliance among 13,82 individuals drawn from around 2500 households in 90 villages and 9 urban areas from all the four districts. The results of this survey are summarised using two terms, i.e., coverage

(percentage of number of individuals who received tablets to the total eligible individuals [above 2 years of age]) and compliance (percentage of number of individuals who consumed tablets to the total eligible individuals [above 2 years of age]). In addition to household quantitative survey, qualitative data are collected through focus group discussions with community members (n=12 groups) and health workers (n=8 groups), and semi-structured interviews with key informants in the community (n=52), diseased (filarial) persons (n=20), persons associated with non governmental organisations (n=9), private practitioners (n=14), medical officers at primary health centres (n=15) and district level health officers (n=3). The data were examined separately for clusters recorded high and low coverage and compliance.

Results

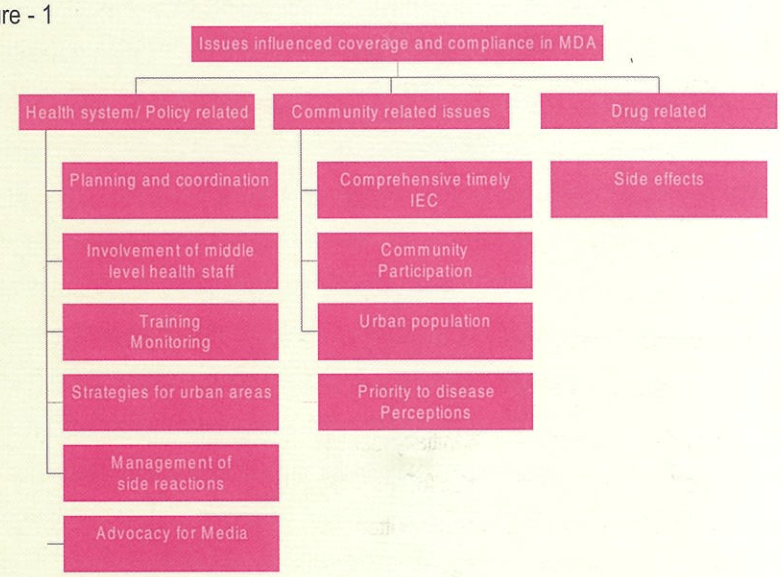
The results of household coverage survey showed that 67.05% of people received drugs (coverage) and 41.57% of people consumed drugs (compliance). Of all the four districts, Balasore district recorded the highest coverage and compliance rates, where as Khurda district recorded the lowest rates. There are no differences between males and females. But the rural-urban differences are significant. Urban areas recorded lower rates. Nearly 60% of the villages recorded the coverage rate of more than 80% and three villages recorded zero coverage. With regard to compliance rate, many of the villages fall in the range of 31-80%. It is to be noted that 30 villages recorded the coverage of more than 90%, but only two villages are remained in that range with regard to compliance rate. There is a wide gap between coverage and compliance. A considerable proportion (25%) of people had not consumed tablets though they received tablets from health worker/drug distributor. The present study probed for the reasons for 'not receiving' and 'not swallowing' tablets at household level. The most predominant reason for non-reception of drugs was health worker or drug distributor did not visit their family. The other reasons are 'absence of family members', 'felt unnecessary', 'fear of side effects', etc. A small proportion of people have not taken drugs by saying the 'children are below two years of age'. Regarding the failure of consuming drugs even after receiving drugs, the predominant reason is fear of side reaction. It is followed by 'sick', 'felt unnecessary', etc.

The comparison between districts with intense and moderate package of community mobilisation for behavioural impact (COMBI) indicates that moderate COMBI districts achieved slightly higher coverage and compliance rates, and there is no differential impact of the package (intense vs. moderate), though there is impact of the overall programme. Pre and post intervention KAP surveys indicated that there is no impact of COMBI on the change of knowledge of the community also. These COMBI processes have not been undertaken taken as prescribed in many instances, particularly in terms of time and quality. It may be

one of the reasons for lower impact. It can be summarised that the social mobilisation strategies are essential for achieving higher compliance in mass drug administration programme, but it can be with limited inputs, with selected activities.

The programme recorded relatively lower rates of coverage and compliance. The qualitative data of each cluster were examined carefully with the consideration of coverage/ compliance as backdrop. Utilising both quantitative and qualitative methods strengthen the value of observations, and capturing of actual feelings of respondents can only be possible in qualitative methods. By synthesising both methodologies, the study could identify various issues that influenced coverage and compliance of MDA, and these issues have been categorised as health system/policy related, community related and drug related issues (Figure-1).

Figure - 1



Summary:

This study reports the coverage, compliance and other operational issues of mass drug administration (MDA) of diethylcarbamazine and albendazole under programme to eliminate lymphatic filariasis (PELF) in Orissa state of India. Both quantitative and qualitative methods were used to collect data from 90 villages and 9 urban areas of 4 districts of Orissa, India. In Orissa, 67% of people of above 2 years of age had received the drugs (coverage) during MDA and only 42% had consumed them (compliance). About 25% of people had not consumed though they received the tablets. Urban areas recorded lower rates than rural areas. The study identified some policy/health system related; community related and drug related issues that influenced coverage and compliance of MDA in Orissa.

8.2 Study on Natural Progression of Filarial Clinical Spectrum in an Endemic Population.

Status:
Intramural

Investigators:
Dr. S.S.S.Mohapatra
Dr. A.S.Kerketta

Starting date: March 2001;
Closing date: December 2002

Objectives:

1. To reassess the earlier defined cohort population of asymptomatic microfilaria carriers and endemic normals for any clinical stage conversion, parasitological and antigen status.
2. To correlate data on clinical stage conversion with Microfilaria and antigen status.

Out of the cohort of 224 endemic normal population identified in year 1983 and followed up periodically yearly up to 1994, it showed that only 67.5% maintained endemic normal status in 1994, while others have manifested conversion to other stages of the spectrum, i.e. either to AMC or acute / chronic clinical disease. In the year 2001 and 2002 (after 7 years), the same cohort were reassessed by clinical, parasitological and antigen status to observe further change in course of filarial infection. Out of 224 identified cohort, 144 (64%) were available for follow up examination. The rest 36% who were not available and could not be followed up were due to demographic transition (marriage, death, and migration). Out of 144 cases followed up, 108 (75%) were found with EN stage, 14 (9.7%) AMC (Asymptomatic Microfilaria Carrier), 2 (1.4%) clinical disease with Microfilaria, and 20 (13.9%) with filarial disease without microfilaria (Table 1). CFA test carried out by ICT in all 144 subjects detected antigen in 33 (22.9%) cases indicating that they carry adult W. bancrofti antigen product in their blood. Amongst those maintaining EN status, 13.9% were CFA positive, who can be considered as cryptic cases. The result showed that 13.9% developed clinical disease without prepatent stage of microfilaraemia (Fig.1).

The cohort of 163 AMCs identified in 1984 and yearly followed up till 1990 were reassessed in 2001-02. Out of these 163 initially identified only 109 (66.9%) were available in 2001 and followed up. Others could not be followed for similar reasons as for ENs (Table 2). They were examined for their latest conversion pattern and CFA status. The results showed that a total of 70 (64.2%) were converted to different spectrum. The maximum conversion was to EN stage (53.2%). Out of the 109 AMC followed up (53.2%) were converted to EN, 39 (35.87%) remained as AMC, 7 (6.4%) had disease with microfilaraemia, and 5 (4.6%) cases had disease without detectable Mf. ICT was carried out in all the 109 cases. Among the 58 individuals who were converted to EN, 44 (76%) were found CFA +ve. On the other hand 12 cases who are converted to disease (7 with mf and 5 without mf), none of these were positive for CFA (Fig.2).

The result does not show any correlation between antigenaemic status and clinical disease manifestation amongst microfilaraemics. Large proportion of microfilaraemics (53.2%) reverted back to endemic normal stage indicating natural protection. After a gap of 18 years, it is observed that AMC stage is further maintained by pool., i.e. although 57% showed conversion, in the long run majority of them reverted back to AMC stage. Only 11% showed

disease stage on 18th year. Because majority subjects who had experienced disease got converted to 'No disease' (53.2%) during the course. Cent percent of the subjects who continued their AMC status till 2001-02 were showing CFA+ve, but those who became amicrofilaraemic from AMC were found 76% CFA+ve. Contrary to this those who are converted to disease were found CFA-ve.

Table 1 : EN Normal conversion.

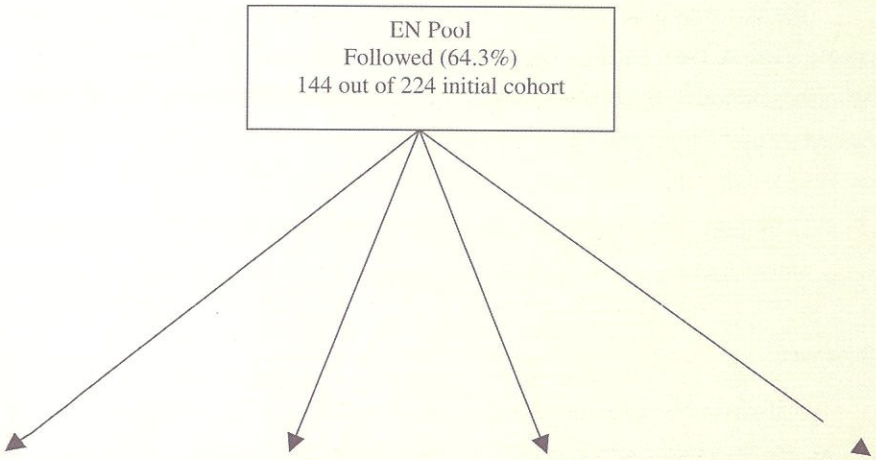
Year	Total Pop.	Mf-Dis-	Mf+Dis -	Mf+Dis+	Mf-Dis +	Total Conversion
1983	224	224 (100)	-	-	-	-
1990	223	210 (94.1)	0	2 (0.9)	11 (4.9)	13 (5.8)
1992	221	195 (88.2)	3 (1.3)	0	23 (10.4)	26 (11.8)
1993	206	164 (79.6)	17 (8.2)	0	25 (12.1)	42 (20.4)
1994	164	112 (67.5)	17 (10.2)	2	35	54
2001	144	108 (75.0)*	14 (9.7)	2 (1.4)	20 (13.9)	36 (25.0)

Table 2: AMC Conversion

Year	Total Popl.	Remained as AMC	Mf+Dis +	Mf-veDis +	Mf-Dis-	Total Conversion
1983	163	163 (100)	-	-	-	-
1984	163	141 (85.5)	10 (6.1)	2 (1.2)	10 (6.1)	22 (13.5)
1985	141	119 (84.4)	12 (8.5)	3 (2.1)	7 (4.9)	22 (15.6)
1986	119	93 (78.1)	13 (10.9)	5 (4.2)	8 (6.7)	26 (21.8)
1987	93	81 (87.0)	10 (10.7)	1 (1.0)	1 (1.0)	12(12.9)
1988	81	58 (71.6)	15(18.5)	1 (1.2)	7 (8.6%)	23 (28.4)
1989	85	50 (86.2)	6 (10.3)	2 (3.4)	0	8 (13.8)
1990	50	43 (86.0)	2 (4.0)	2 (4.0)	3 (6.0)	7 (14.0)
1994	43	14 (32.6)	3 (6.9)	6 (13.9)	20 (46.5)	29 (67.4)
2001	9	4 (44.4)	1 (11.1)	0 (0)	4 (44.4)	5 (55.6)

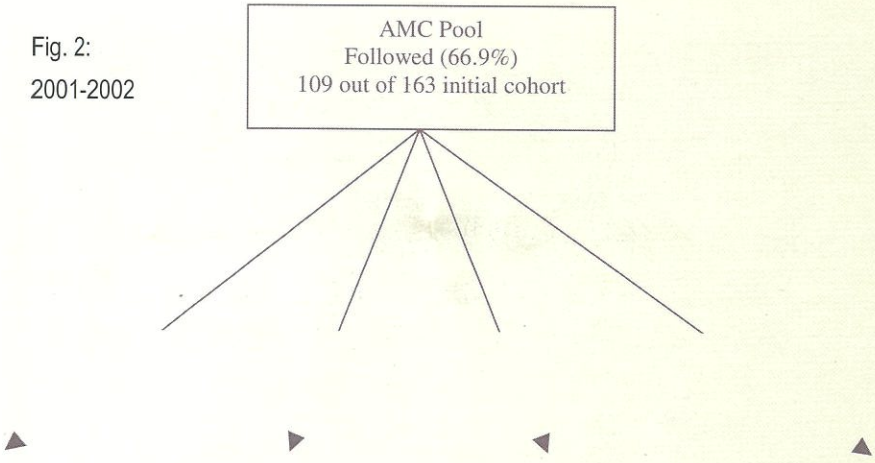
Fig. in parenthesis shows %.

Fig. 1: 2001-2002



Remained as EN :	AMC:	Diseased with mf:	Diseased without
108 (75%)	14 (9.7%)	2 (1.4%)	Mf:20 (13.9%)
CFA Done: 108	CFA Done: 14	CFA done: 2	CFA done: 20
+ve: 15 (13.9%)	+ve:14 (100%)	+ve: 2 (100)	+ve : 2 (10%)

Fig. 2:
2001-2002



Remained as	Endemic Normal: 58	Diseased with mf: 7	Diseased without
AMC : 39 (35.8%)	(53.2%)	(6.4%)	Mf:5 (4.6%)
CFA Done: 39	CFA Done: 58	CFA done: 7	CFA done: 5
+ve: 39 (100%)	+ve:44 (76%)	+ve: 0 (0%)	+ve : 0 (0%)

Summary and conclusion:

The study was undertaken to elicit information on natural course of filarial infection in endemic situation. The cohort population followed periodically, amongst initially identified EN & AMC groups indicated their clinical stage and parasite status conversion over time. The information obtained are useful in undertaking the natural course.

8.3 Point prevalence and follow-up study of lymphatic filariasis in an endemic area of Orissa

Status:
Intramural

Investigator:
Dr. G.P.Chhotray
Dr. M.R.Ranjit
Mr. H.K.Khuntia

Starting date: January 1999
Closing date: August 2002

Objectives:

1. To find out the prevalence of various clinical manifestations of filarial disease in Puri and Khurda district of Orissa and its follow up at two different points of time.
2. To study the pathology and pathogenesis of various atypical / occult filarial disease with or without intervention.

The project has been completed and the filaraemetric data in the initial and follow up studies has been depicted in Table 1, with the the following conclusions.

COMPARATIVE FILARIOMETRIC DATA

Particulars	Satyabadi Block		Jatni Block		Total	
	Initial (1989-1993)	Follow-up (1999-2002)	Initial (1989-1993)	Follow-up (1999-2002)	Initial (1989-1993)	Follow-up (1999-2002)
Population	2187	1700	1444	891	3631	2591
Examined (M / F)	(1155 / 1032)	(1059 / 641)	(789 / 655)	(535 / 256)	(1844 / 1687)	(1594 / 897)
Endemic Normal	1253	1196	956	557	2209	1753
(Mf -ve, Dis -ve)	(57.3%)	(70.4%)	(66.2%)	(62.5%)	(60.8%)	(67.7%)
Mf +ve	201 (Wb143 Bm=55 Mixed=03)	99 Wb=85, Bm=9, Mixed=1)	195 (Wb=All)	114 (Wb=All)	396	213
AFD with Mf-ve	539	237	150	107	689	344
CFD	194	168	143	113	337	281
Mf Rate	9.2	5.8	13.5	12.8	10.9	8.2
Disease Rate	33.5	23.8	20.3	24.7	28.3	24.1
MfD 50	Wb 6.8+1.8 Bm 3+1.1	Wb 6.3+1.9 Bm 2.7+1.4	30.6+1.6	28.8+2.3	21.3+1.9	22.6+1.8

Mf rate	Initial vs. follow-up
Satyabadi	$Z = 3.902$ ($p < 0.001$)
Jatni	$Z = 0.49$ ($p > 0.05$)
Total	$Z = 2.80$ ($p < 0.01$)

Disease Rate	Initial vs. follow-up
Satyabadi	$Z = 6.58$ ($p < 0.001$)
Jatni	$Z = 1.49$ ($p > 0.01$)
Total	$Z = 3.6$ ($p < 0.01$)

Conclusion:

1. High Mf rate and disease rate in the study area and follow-up clearly establishes the fact that the disease is endemic in study area and people residing the area are exposed to risk of infection.
2. Confirms the occurrence of all the clinical stages of the diseases.
3. Occurrence of the clinical disease manifestation do not exactly reflect the Mf positivity.
4. Interesting finding is the constant occurrence of filarial associated manifestations which responds to filarial treatment.
5. Progression of the disease is slow.
6. Identification of cross section of adult filarial worm in lymphnode and testicular tissue confirms pathology and pathogenesis of disease to be of filarial origin.
7. Increased collagenisation in histopathological sections needs to be studied further.

8.4 A comprehensive study on delivery of health care research for capacity building amongst primitive tribes of Orissa

Status:
Extramural (ICMR Task Force)

Principal Investigator:
Dr. G.P.Chhotray

Starting date: December 1999
Closing date: January 2003

The health has been declared as a fundamental right and the state has the responsibility for the health of its people. Taking in to consideration the above fact, the Govt. of India, over views and co - ordinates the health programme with relation to braod national objective - "Health for all by 2000 AD" through primary health care delivery system.

This community based comprehensive study on two primitive tribes of Orissa namely Bondo and Didayi was with the following aims and objectives.

1. A Comprehensive assessment of health status and epidemiological profile of the two primitive tribes such as Bondo and Didayi
2. Demographic profiles studies reflecting the vital events and their statistics such as various mortality pattern amongst the primitive tribes.
3. Various growth and fertility parameters in context to the national scenario to explain the extinctive nature of primitive tribes.
4. Study of the dietary habit & assessment of nutritional status with reference to various nutritional deficiency disorders as per the specific geo-climatic and socio-biological context of different primitive tribes.
5. In-depth study of genetic diseases in various hereditary haematological disorder like haemoglobinopathy (Sickle cell anaemia and G6PD deficiency).
6. To study health culture and health related behaviour so as to carry out various intervention programme in primitive tribal population and longitudinal follow-up.

The basic information on Bondo and Didayi in relation to origin, distribution, habits, habitat, diet, social organization, economy, health and health related behavior have been collected. Ten percent of the total population of each tribe comprising 526 Bondo and 533 Didayi are studied as the sample population. It was observed that the Bondo and Didayi

constitute 0.14% of the total state's tribal population, where female outnumber the male (sex ratio being 1188 and 1116 per 1000 males in Bondo and Didayi respectively). The decadal growth rate / literacy rate was observed to be 12.2 / 9.4 and 7.8 / 12.8 respectively from 1954 sample studied in Bondo and similarly 47, 40 and 7 among 1697 Didayi tribe.

The comprehensive health status among the two tribes were studied and it was observed that the anaemia was the most important clinical finding in 54.8% and 63.6% of the studied Bondo and Didayi children (0 - 14 years), while 54.3% and 39.9% in the adult (> 14 years) respectively. This was followed by fever, acute respiratory disease, diarrhoeal disorder (Table 1). Malaria continues to be one of the important health problem in these areas (SPR: 15.5% in Bondo and SPR: 15.4% in Didayi). Of which 93.5% and 91.6% were P. falciparum. (Table 2) However, the spleen rate was observed to be 25.8% and 35.08% respectively. The nutritional status based on anthropometric indices revealed that 6.5% and 5.9% of children (0 - 14 years) had severe stunting, while 22. 1 and 19.7% had severe wasting and 21.2% and 18.8% had severe underweight in Bondo and Didayi population respectively. Amongst the various hereditary haematological disorder studied haemoglobinopathies was observed in 2.2% of the cases (all of them were b thalassaemia trait), sickle cell disease in 1.9% of case (all of them are sickle cell trait) and G6PD deficiency in 2.3% cases. The laboratory investigation and peripheral smear examination of all anaemia cases revealed that 60% of the cases were having microcytic - hypochromic blood picture indicating iron deficiency anaemia. The study in dietary habit revealed that 24 hour calories intake were 1931 and 2420 in Bondo and Didayi respectively and majority of the calories comes from consumption of cereals.

The health care delivery in these areas (dominated by these tribes) are very poor being situated in inaccessible forest and hilly areas. The health culture and health related behavior is still rudimentary in comparison to the modern scientific developments and still practise their own traditional belief, customs and practices.

Summary and conclusion:

Studied tribes are most primitive in nature, reside in inaccessible forest and hilly area far from civilization, endogamous, retain their own culture, tradition, food habit etc., do not use modern agriculture equipment, decadal growth rate is low as compared to national and state figure, literacy rate is very low, female outnumber male. The health facilities are not accessible, immunisation not proper, prefer traditional medicine and health. The socio economic condition is low.

The capacity building improves after post intervention and IEC activity.

Table 1: Comprehensive health status of studied tribes

Sl. No.	Diseases	Children (0 - 14 Yrs)		Adult (> 14 Yrs)	
		Bondo (n = 237)	Didayi (n = 250)	Bondo (n = 289)	Didayi (n = 283)
1	Respiratory Diseases,Cough, URTI, Asthma & Bronchitis	42 (17.7)	70 (28.0)	38 (13.1) 3 (1.04)	47 (16.6)
2	Fever	44 (18.6)	83 (33.2)	65 (22.5)	38 (13.3)
3	Malaria	41 (17.3)	61 (24.4)	42 (14.5)	29 (10.2)
4	Diarrhoeal disorder including cholera	31 (13.1)	33 (13.2)	34 (11.7)	36 (12.7)
5	Cardio vascular hypertension			23 (7.9)	32 (11.3)
6	Infected diseases • Tuberculosis • Leprosy • Yaws • Hepatitis			 2 (0.7) 2 (0.7) 1 (0.35) 1 (0.35)	 10 (3.5) 2 (0.7)
7	Anaemia	130 (54.8)	159 (63.6)	157 (54.3)	113 (39.9)

Table 2: Malaria amongst the studied tribe

Tribe	Total Sample Collected	SPR (%)	PF % of SPR	Spleen Rate (%)
Bondo	526	15.5	93.5	25.85
Didayi	533	15.4	91.6	35.08

8.5 Assessment of Health and Nutritional profile among the elderly population of Orissa primitive tribes

Funding:

ICMR Extra-mural

Investigators:

Dr. G.Bulliyya, Dr.SSS.Mohapatra
Dr.A.S.Kerketta, Mr.P.K.Jangid

Duration:

Nov. 1999 to Apr. 2002 (completed)

Objectives:

1. Too study the morbidity pattern of the elderly among three primitive tribal groups;
2. To screen the malnutrition, dietary habits and food intake patterns;
3. To compare the finding with tribal and non-tribal groups of other states and;
4. To find out the possible causes and suggest remedial measures.

This study was completed in the month of April 2002. Field visits have been made among Paudi Bhuiyan, Kondh and Lanjia Saura primitive tribal groups in Angul, Rayagada and Kalahandi districts and studied 474 elderly subjects. As per the ICMR instructions, the one-month (April, 2002) work progress has been merged with the progress report of the

previous year 2001-2002. A total of 1634 elderly from Paudi Bhuniya (606), Kondhs (616) and Lanjia Saura (414) primitive groups were studied (Table 1).

Table 1. Study population by age and sex among the Orissa elderly primitive tribal groups

Primitive tribe	Sex	Age group in years			Total population
		60-69	70-79	80<	
Paudi Bhuniya	Males	74.7 (168)	19.5 (44)	5.8 (13)	37.3 (225)
	Females	58.3 (221)	33.0 (145)	8.7 (33)	62.7 (379)
	Total	64.4 (389)	28.0 (169)	7.6 (46)	100.0 (604)
Kondhs	Males	75.5 (176)	21.0 (49)	3.5 (8)	37.8 (233)
	Females	71.5 (274)	23.3 (89)	5.2 (20)	62.2 (383)
	Total	73.1 (450)	22.4 (138)	4.5 (28)	100.0 (616)
Lanjia Saura	Males	83.3 (110)	14.4 (19)	2.3 (3)	31.9 (132)
	Females	79.4 (224)	19.1 (54)	1.4 (4)	68.1 (282)
	Total	80.7 (334)	17.6 (73)	1.7 (7)	100.0 (414)
Total	Males	76.9 (454)	19.0 (112)	4.1 (24)	36.1 (590)
	Females	68.9 (719)	25.7 (268)	5.4 (57)	63.9 (1044)
	Total	71.8 (1173)	23.2 (380)	5.0 (81)	100.0 (1634)

Figures in parentheses are sample number

Tribal Meeting (18-19, september 2003)

The prevalence of chronic energy deficiency (CED) assessed by using body-mass index as a nutritional index among the elderly primitive tribes show that two-third of the elderly suffering from different grades (Table 2). The prevalence of CED was 70% among the Paudi Bhuniya followed by 69% among the Kondh and 63% and among the Lanjia Saura. Further, considerable proportions of elderly population were suffering from moderate (19.0%, 18.0% and 16.0%) and severe grades (19%, 17%, 15%) of CED. The proportions of normal and below normal elderly were 17% and 20% respectively among the elderly Lanjia Saura, Kondh and Paudi Bhuniyas.

Table 2.Prevalence of chronic energy deficiency by BMI among three elderly primitive tribals

Nuritional grade/CED (BMI:kg/m^2)	Paudi Bhuniya (604)	Kondhs (616)	Lanjia Saura (414)
Normal (BMI >20.0)	9.6 (58)	8.0 (49)	17.0 (76)
Below-normal (18.5-20.0)	20.9 (126)	23.0 (142)	20.0 (82)
Grade-I/mild (17.0-18.5)	31.5 (190)	33.0 (203)	32.0 (133)
Grade-II/ moderate (16.0-17.0)	19.0 (115)	19.0 (110)	16.0 (66)
Grade-III/severe (BMI<16.0)	19.0 (115)	17.0 (105)	15.0 (63)

Figures in parentheses are sample number.

Table 3 shows anaemia status characterized by a low level of haemoglobin (Hb) levels among the elderly primitive tribes. Severity of anaemia categorized using the WHO classification (1968) of adult males and non-pregnant females, since no cut-off values recommended for elderly population. The levels of haemoglobin were distinguished as mild anaemia 11-12.9g/dL for males and 10-11.9gdL for females, moderate anaemia (9-10.9g/dL for males and 8-9.9g/dL for females), and severe anaemia (<9.0g/dL for males and 8.0g/dL for females). Overall, 90% of the elderly had some level of anaemia, including 12-18% who were mildly anaemic, 40-50% who were moderately anaemic and 20-40% who were severely anaemic. The prevalence of anaemia for males (Hb<13 mg/dL) was high in Kutia Kondh and Lanjia Saura (98.6%) than in Paudi Bhuniya (96.9%). The extent of moderate anaemia is higher than severe followed by mild and normal among the three study groups. Severe grade of anaemia found to be high in Lanjia Saura (40.3%) than that of in Kondhs (38.6%) and Paudi Bhuniyas (20.2%). The proportion of females with different grades of anaemia was higher than their male counterparts. Examinations of blood smear samples (115) from anaemic elderly subjects revealed microcytic and hypochromic anaemia.

Table 3. Prevalence of anaemia by severity among Orissa elderly primitive tribal groups

Anaemia grade by haemoglobin level*	Paudi Bhuniya	Kondhs	Lanjia Saura
Males	(n=225)	(n=233)	(n=132)
Normal (>13.0 g/dL)	8.4 (19)	5.1 (12)	4.5 (6)
Mild (11.0-12.9 g/dL)	16.5 (37)	15.0 (35)	12.9 (17)
Moderate (9.0-10.9 g/dL)	50.2 (113)	40.8 (95)	37.9 (50)
Severe (<9.0 g/dL)	24.9 (56)	39.1 (91)	44.7 (59)
Females	(n=379)	(n=383)	(n=282)
Normal (>12.0 g/dL)	12.7 (48)	6.3 (24)	6.4 (18)
Mild (10.0-11.9 g/dL)	19.5 (74)	20.6 (79)	11.7 (33)
Moderate (8.0-9.9 g/dL)	50.4 (191)	39.9(153)	43.6(123)
Severe (<8.0 g/dL)	17.4 (66)	33.2(127)	38.3(108)
Pooled	(n=604)	(n=616)	(n=414)
Normal	11.1 (67)	5.8 (36)	5.8 (24)
Mild	18.4 (111)	15.3(114)	12.1 (50)
Moderate	50.3 (304)	40.3(248)	41.8(173)
Severe	20.2 (122)	38.6(218)	40.3(167)

Figures in parentheses are sample number. WHO-TRS-405,1968

Table 4. Mean daily intake of foodstuffs and nutrients among elderly primitive tribal groups

Foodstuffs (grams)		Paudi Bhuniya (120)		Kondhs (123)		Lanjia Saura (94)		RDI	
		M(48)	F(72)	M(53)	F(70)	M(37)	F(57)	M	F
Cereals and millets		346	286	335	310	335	328	460	410
Pulses and legumes		16.1	14.3	22.6	18.1	24.5	15.8	40	40
Green vegetables		44.7	45.4	40.5	38.8	50.7	41.4	40	100
Other vegetables		19.2	18.4	22.9	18.1	32.5	25.5	60	40
Roots and tubers		17.8	16.4	20.7	16.0	18.3	16.2	50	40
Nuts and seeds		0.3	0.2	0.2	0.1	0.3	0.1	-	-
Condiment-spices		7.6	5.8	8.8	5.2	6.1	5.4	-	-
Fruits		26.6	18.2	14.4	8.8	28.7	16.8	-	-
Fish		0.2	0.1	2.6	2.0	1.3	0.4	-	-
Flesh Foods		2.8	1.4	3.5	1.8	3.4	2.1	-	-
Milk&milk product		0.8	0.2	2.1	0.1	1.4	0.1	150	100
Fats and oils		3.3	3.0	4.8	3.6	6.5	4.7	40	20
Sugar & jaggery		1.4	0.6	1.8	1.0	2.6	1.8	30	35
Nutrients								RDA	
Protein (g)		36.4	30.1	40.6	36.4	32.1	37.4	60	50
Fats (g)		8.2	7.1	8.9	8.1	10.3	8.8	20	20
Minerals (g)		7.0	6.6	9.8	5.9	9.2	8.4	-	-
Fibre (g)		4.9	4.0	5.1	4.6	7.2	6.6	-	-
Carbohydrates (g)		291	247	311	274	343	307	-	-
Energy (kcal)		1246	1191	1385	1269	1546	1283	2425	1875
Calcium (mg)		296	271	361	312	384	322	400	400
Phosphorus (ug)		866	818	884	764	899	827	-	-
Iron (mg)		19.4	12.4	22.1	13.6	24.2	18.0	28	30
Carotene (ug)		1661	1723	1486	1014	1792	1512	600	600
Thiamine (mg)		0.7	0.5	1.0	0.7	1.1	0.8	21.2	0.9
Riboflavin (mg)		0.9	0.7	1.0	0.6	1.0	0.8	1.4	1.1
Niacin (mg)		8.1	8.0	10.2	9.4	11.1	10.2	16	12
Vitamin-C (ug)		68	66	54	50	69	66	40	40
Folic acid (ug)	Free	22.4	15.0	24.6	19.3	23.4	17.7	100	100
	Total	38.6	46.0	40.7	33.5	46.0	34.3	-	-

M=Males, F=Females, RDA and RDI =Recommended Dietary Allowances and intakes for Indian males and females aged 18 years and above (ICMR, 1981).

The consumption of foodstuffs and nutrients among the elderly primitive tribes according to sex is presented in Table 4. The dietary levels suggested for adult males and females were used since no recommended dietary intakes suggested so far for the elderly for comparison. Mean intake of cereals and millets though formed the bulk of dietaries were far below the suggested levels. In males, cereals and millets together ranged from 335g in Kutia Kondh, Lanjia Saura to 346g in Paudi Bhuniya, whereas in females the intakes were 310g, 328g and 286g respectively. The mean intake of pulses for males was (16.1-24.5g) relatively higher than their female counterparts (14.3-18.1g), which cover 44-65% of the RDI. Consumption of green leafy vegetables was satisfactory in the case of males, but still lower in the case of females as against the RDI. Daily intakes of all other foods were much below the recommended level both for males and females. The intakes of flesh foods, fats and oils were considerably low. The most striking feature is intake of milk, which is a taboo among these tribal groups hence, consumption of milk and milk products were grossly deficit. The mean intake of protein ranged from a low 32.1g in Lanjia Saura to a high of 40.6g in Kutia Kondh males and 30.19 in Paudi Bhuniya to 37.4g in Lanjia Saura females, which were far below the Recommended Dietary Allowances (RDA). Similarly, the intake of fat was less 48-51% for males and 60-64% for females against 20g of RDA. The range of energy intake for males (1246-1546Kcal) and females (1191-1283Kcal) was much lower than the recommended levels. The intake of carotene/vitamin A was adequate. However, other micronutrients intake (iron, calcium, thiamine, riboflavin, niacin and folic acid) was far below the suggested levels. The study groups were deficient in terms of quantity with an exception of vitamin-A intake, because of higher consumption of green leafy vegetables. The overall intake of nutrients among the elderly primitive tribal communities was much deficient in comparison to the RDA (1990) suggested for adult Indians.

Summary and conclusions

In summary, the health status of the elderly primitive tribal groups is mostly afflicted due to illiteracy, poor hygiene and environmental living standards, household conditions. They are most vulnerable to nutritional deficiencies and ill-health conditions as they particularly caught in vicious circle of health, culture and environment syndrome. Average intake of foodstuffs is less than RDI and all nutrients, except vitamin A intake are less than RDA. Their food intake is inadequate both in protein and energy as well as vital nutrients. This could be due food insecurity accompanied less consumption of iron-rich foods, vitamin-C rich foods and seasonal variation in food scarcity. Undernutrition in the form of chronic energy deficiency is found in 63-70% of elderly population. Anaemia is predominant that leads to serious health concern for elderly because it can result impaired work performance, behaviour and increase the risk of morbidity from infectious diseases. More than 90% of the elderly are suffering from different grades of anaemia. Females suffer more likely to have moderate and severe grades than their male counterparts. Diet surveys revealed that habitual

activity lead to imbalance between body demand and requirement. Elderly population continue to suffer with high rates of undernutrition and infectious diseases, which needs future intervention strategies in combating malnutrition. Intervention strategies are underway in identifying various contributory factors to improve the health and nutritional status of Orissa primitive tribal groups.

Status:
Extramural (NIN, Hyderabad; Funding: WHO)

Investigators:
Dr.S.K.Kar
Dr.SSS.Mohapatra
Dr. G.Bulliyya
Dr.A.Mohapatra

Starting date: January 2002
Closing date: February 2003

8.6 Assessment of prevalence of IDD in selected districts in eastern region of India.

Objective:

This multicentric study aims to assess the current status of iodine deficiency disorders in a representative sample of the districts in eastern region of the country.

This includes assessment of the prevalence of clinical forms of IDD among 6-12 year children, urinary iodine excretion levels and iodine content of iodized salt used by the community. The study sites include five states like Orissa, Bihar, Jarkhand, Sikkim and West Bengal. Thirty cluster sampling procedure was adopted for each district. The data comprised of clinical evaluation of goiter on 10500 school children aged 6-12 years, 2100 salt samples spot testing and household KAP and 210 urinary iodine exertion levels and salt titration for iodine. Data collection and sample analysis have been completed for all the districts.

Results:

According to total goiter rate (TGR), the severity of IDD is moderate in Cuttack, Darjeeling, New Jalpaiguri, Palamu and East Gangtok, North Mangam districts, while it is severe in Sundargarh district of Orissa and West Champaram district of Bihar (Table-1). The prevalence of goiter is higher in girls than in boys. The proportions of children with other forms of IDD are negligible in Cuttack district. As per median urinary iodine excretion levels of school-age children, all the studied districts are free from IDD with an exception of West Champaram and North Mangam, where the problem of IDD varies from mild to moderate degree. Children with normal UIEL are high in New Jalpaiguri district (63.8%) and as low as 15.5% in West Champaram, Bihar.

Table 2 showing distribution of households according to iodine content in salt samples by spot testing method indicates that proportion of salt samples with recommended levels of iodine content (>15 ppm) is as high as 94.7% in North Mangam to as low as 22.2% in Palamu district. Similar trend is observed when a sub-sample of these salt samples tested by titration method.

Table 1. Status of IDD in different districts in eastern part of India.

Eastern states	District surveyed	Total goiter rate (TGR) (n=10500)	Median urinary iodine excretion (ug/L) (n=210)
Orissa	1.Cuttack	21.9	112.5
	2.Sudergarh	39.6	100.0
West Bengal	3.Darjeeling	22.9	107.5
	4.New Jalpaiguri	23.1	115.0
Bihar	5.West Champaram	40.1	45.0
Jharkand	6.Palamu	22.0	55.0
Sikkim	7.East Gangtok	22.6	138.9
	8.North Mangam	23.7	55.0

Table 2: Distribution of households according to iodine levels in salt samples.

Eastern State	District surveyed	Salt iodine by spot Testing		Salt iodine by Titration (n=210)	
		<15ppm	>15ppm	<15ppm	>15ppm
Orissa	1.Cuttack	68.8	31.2	78.1	21.9
	2.Sudergarh	67.9	32.1	77.6	22.4
West Bengal	3.Darjeeling	46.8	53.2	49.0	56.0
	4.New Jalpaiguri	66.8	33.2	55.7	44.3
Bihar	5.WestChamparam	73.7	26.3	72.4	27.6
Jharkand	6.Palamu	81.8	22.2	77.6	22.4
Sikkim	7.East Gangtok	8.2	91.8	30.5	69.5
	8.North Mangam	5.3	94.7	30.0	70.0

Summary and conclusion:

Proportion of population using iodized salt with recommended levels of iodine (>15 ppm) are found lower in districts like Sundergarh, Cuttack, Palamu, New Jalpaiguri and West Champaram. Out of these districts, Sudergarh and West Champaram population showed higher frequency of TGR while the rest are moderately endemic for IDD. As per median urinary iodine levels, the problem of IDD is normal except in 3 districts, where it is mild in North Mangam and Palamu districts and moderate in West Champaram. While clinical goitre expression takes longer time to manifest in case of lower levels of iodine intake, the median urinary iodine excretion reflect recent iodine intake. The programme

needs to look for improved iodized salt consumption in districts showing low consumption. Even when normal levels of iodine is available at the consumer end, it depends largely on the losses during preservation and during cooking process.

8.7 Operational evaluation of stability of iodine in double fortified salt(DFS): a multi-centric study

Status:
Extramural (ICMR)

Investigators:
Dr.SSS.Mohapatra
Dr. G.Bulliyya
Dr.A.Mohapatra

Starting date: October 2001
Closing date: February 2003

Objective:

To study the stability of iodine in DFS and IS during storage for a period of one year under different conditions of storage in six different centres in India and to analyze the results of iodine stability after six months as an interim step and at the end of one year for final analysis.

The study started with the salt samples of 159 bags, obtained from different colony each containing RCS-DFS and CS-DFS, RCS-IS and CS-IS in a double blind fashion. The bags are stored in places having different environmental exposures namely inside room, verandah and open air according to specified instructions. The sampling procedure adopted from each bag of salt upon arrival and quantified iodine level in parts per million using titration method. Duplicate samples are sent to NIN, Hyderabad for quality control. The salt samples are analyzed at regular quarterly intervals of storage.

Summary:

The analytical data of coded salt samples were submitted to the NIN laboratory for decoding of samples and evaluation. Since it is a multi-centric double-blind study, the results will be received after decoding at central laboratory of NIN, Hyderabad.

Expected outcome:

To help identifying the recommended level for preparation double fortified salt (DFS) and iodised salt (IS) using both refined common salts and commercial salts on a large scale basis in a factory to account for natural loss due to preservation.

General Information & Publications

9

INSIDE

GENERAL INFORMATION

9.1 library information publications:

During the year the library & information division has widened its services by including publication activities for IEC campaign. Half yearly RMRC News Bulletin is regularly published. Besides two booklets on Malaria and Filariasis and three leaflets on IDD, Filariasis and Malaria have been published. Like last year, the library has renewed its subscription for all 70 journals. This year two new foreign journals (1. Nature Medicine, 2. Nature Immunology) have been added to the list. Now the Library is subscribing total 36 foreign, 34 Indian Journals for its users. Besides these more than 20 Newsletters are being received from various research organizations as gratis. Library is also getting 7 daily Newspapers and 3 magazines for readers. The library caters library, Information and reprographic support to its users. Recently library has procured a Digital copier cum LAN Printer for reprographic activities.

Library Automation: This year Library has procured " Libsys- IV (Web OPAC)" software for library computerization. The software has installed and initial data entry work has started. LAN facility in RMRC building is already initiated and it will be materialized very soon. As soon as LAN is completed and data entry work of library collections is completed the RMRC library can be accessed through LAN and Web.

Services: The library & Information division continued its information services to the readers. The services like On-Line Database search, INTERNET access, E- mail facility to the scientists, On- line Reprint request, ICMR library Network for resource sharing are being rendered to the scientists regularly. Information services like local library network for interlibrary loan, photocopying services, Off-line MEDLINE database search (CD-ROM), News clipping and maintaining scientific publications of the Institute are being rendered by the division. IEC materials like Filariasis, Malaria and IDD leaflets and booklets distributed to DHS, Govt. of Orissa and all CDMOs, District Collectors of all 30 districts of Orissa and distributed to public during field studies.

Publications:

1. **Ravindran B. Aping Jane Goodal:** insights in to human lymphatic filariasis. Trends in Parasitology. 2003; 9(3): 105-109.
2. **Das Soma, Varghese V, Chaudury S, Barman P, Mohapatra S, Kojima K, Bhattachary SK, Krishna T, Tatho RK, Chotray G P, Phukan A C, Kobayashi N and Naik T N.** Emergence of Novel Human Group A Rotavirus G12 strains in India. Journal of Clinical Microbiology.2003; 41(6):2760-2762.
3. **Das B.K, Mishra S, Padhi PK, Manish R, Tripathy R, Sahoo PK and Ravindran B** (2003). Pentoxifylline adjunct improves prognosis of human cerebral malaria in adults. Tropical Medicine International Health 2003; 8(8): 680-684.
4. **Chhotray G P, Dash B P, Ranjit M R, Collah R, Mohanty D. Haemoglobin E b-thalassemia :** an experience in eastern Indian state of Orissa. Acta Haematologica 2003; 109 (4) : 214 - 216.
5. **Bal MS, Beuria M.K, Mandal NN and Das M.K.** Antigenemia is associated with low antibody response to carbohydrate determinants of a filarial surface antigen. Parasite Immunology.2003; 25 (2): 107-111.

6. **Ravindran B, Satapathy A K, Sahoo P K and Mohanty M C.** Protective immunity in human lymphatic filariasis: Problems and prospects. Medical Microbiol Immunol.2003; 192: 41-46.

7. **Babu B V and Nayak A N.** Foot care among lymphoedema patients attending filariasis clinic in south India: a study of knowledge and practice. Annals of Tropical Medicine Parasitology, 2003;97 (3):321-324.

8. **Babu BV and Satyanarayana K.** Factors responsible for coverage and compliance in mass drug administration during the programme to eliminate lymphatic filariasis in the East Godavari District, South India. Tropical Doctor. 2003; 33:79-82.

9. **Babu BV and Satyanarayana K.** Healthcare workers' knowledge of lymphatic filariasis and its control in an endemic area of Eastern India: implications on control programme. Tropical Doctor.2003; 33:41-42.

10. **Alli R, Bhunia B, Chhotray G P, Reddy M V R and Harinath B C.** Microscopic haematuria as an occult filarial infection in Bhubaneswar an endemic area for bancroftian filariasis. Indian Journal of clinical Biochemist. 2003;18 (1) :61 - 64.

11. **Bulliyya G.** Anthropometrically determined malnutrition among preschool children in an Integrated Child Development Services Block of Gajapathi district, Orissa. Journal of Human Ecology. 2003; 14(4):291-296.

12. **Balgir RS.** Academic Curricula of Anthropology Need Overhauling: An Observation. Man in India. 2002; 82 (3 & 4): 407-412.

13. **Kar Subrat K , Dash VLN and Babu B V .** Nutritional plight of Orissa: an overview. Man in India. 2002; 82 (1 &2): 143-154.

Publications in Press:

1. **Pal BB, Khuntia H K, Acharya A S, Chhotray G P.** Drug abusers a new high risk group population for HIV infection in Orissa. Indian J Medical Micribiol 2003 (in press)

2. **Bulliyya G.** Anthropoecological dimensions of the Easter Ghats section of Orissa: an overview. South Asian Anthropologist (In press).

3. **B. V. Babu and A.N. Nayak .** Treatment costs and work time loss due to episodic adenolymphangitis in lymphatic filariasis patients in rural communities of Orissa, India. Tropical Medicine and International Health (In press).

9.2 Conference /Workshop organized:

1. Institutional Activity Review Meeting was organised on 6th November 2002. His Excellency, **Sj..M. Rajendran,** Hon'ble Governor of Orissa and other distinguished invitees visited this Centre. His Excellency visited all the laboratories and discussed in details with the Scientists on work of the Centre.

2. RMRC, Bhubaneswar organized the XXIX Annual conference of Indian Immunology Society, 27th - 29th November 2002 at Hotel May Fair, Bhubaneswar. His Excellency **Shri M M Rajendran** , Governor of Orissa addressed the participants while inaugurating the Conference.

16th SAC Meeting at RMRC

3. RMRC, Bhubaneswar Organised Continuing Medical Education (CME) programme in Immunology 26th November 2002 at Bhubaneswar.
4. RMRC, Bhubaneswar organized a Workshop and Training Programme on "Verbal Autopsy" for RGI Surveyors in collaboration with Institute of Helath Systems, Hyderabad from 1-6, January 2003.

9.3 Events and activities:

CME Programme in RMRC:

Regional Medical research Centre, Bhubaneswar organized the Continuing Medical Education (CME) Programme in Immunology on 26th November 2002 at Utkal Univority, Bhubaneswar. About 200 post graduate students from various fields like Biotehnology, Zoology, Botany, Life sciences and MBBS students participated the programme. Eminent scientists like Dr. B. Ravindran, ICMR, Prof. Santosh Kar, Centre for Biotechnology, JNU; Dr. Ajit Sodhi, School of Biotechnology, BHU; Dr. Subhada Chimpulkar, Tata Memorial Hospital, Dr. Vineeta Bal, NII, New Delhi, Dr. Kanury Rao, ICGEB, Dr. Satyajit Rath, NII and Dr. Bidut K Das, SCB Medical College, Cuttack participated in teaching programme for CME in Immunology

(ICMR Foundation day talk)

ICMR Foundation Day Celebration:

Regional Medical Research Centre, Bhubaneswar was observed ICMR foundation day on 15th Nov. 2002 at its premises. On a eve of ICMR day celebration two session were organised. In Scientific session eminent scientist Prof. Basudev Kar, Ex- Principal, SCB Medical College, Cuttack delivered guest lecture on " New Horizons of Biotechnology". In second session devoted for school education programme merely 100 students from three reputed schools were invited and imparted teaching programme on various communicable diseases while demonstrating the findings in various laboratories by scientists. Quiz competition amongst students were also organised to encourage students. Students from three schools from Bhubaneswar were invited and competition and quiz programme was organised. Eminent educationist Prof. Satrugna Nath delivered lecture on " Importance of Health on Educational front" to the school students. Hon'ble Minister for Sports and Youth Affairs, Shri Ranendra Pratap Swain was the chief Guest of the ceremony. He distributed the prizes to the winners.

Governor's Visit to the Institute:

His Excellency Shri M.M.Rajendran, Governor of Orissa visited RMRC, Bhubaneswar on 6th Novenber 2002 and addressed to the scientists on 6th Nov. 2002 and visited different laboratories of the Institute and interacted with each scientist. During the visit he encouraged the scientists while appreciating the work being undertaken.

Swathya Mela:

RMRC participated in Swathya Mela organised by Department of Health & Family Welfare, Govt. of Orissa in collaboration with Orissa Voluntary Health Association (OVHA) at Bhubaneswar from 20-22 Sept. 2002 and in Jeypore from 16-17, December 2002. The

scientists of this Centre organised an exhibition on " counselling and testing of Sickle Cell Diseases" in both venues. More than 200 sickle cell cases were examined and sickle cell testing was carried out.

National Science Day

RMRC, Bhubaneswar observed National Science Day (NSD) on 28th Feb 2003. The theme of the NSD activity for the year 2003 was " 50 years of DNA; 25 years of IVF- the blue print of life. Dr. S.P. Tripathy, Ex- D.G (ICMR) delivered a talk on this occasion.

RMRC Foundation Day Celebration

Regional Medical Research Centre, Bhubaneswar observed its Annual day of the Centre on 29th March 2003. On this occasion Dr. S.P Tripathy founder Directorof RMRC, Bhubaneswar and Ex Director General of ICMR and Prof. Gokulananda Mohapatra eminent scientist and Dr. P. Mohapatra, Director IHS, Hyderabad delivered scientific talks to scientists and invited guests. Staff of this center observed the afternoon session by performing cultural programme like dance, song, quiz and art competition. Union Health Secretary, Joint Secretary and Director, NAMP reviewed the malaria programme undertaken in Orissa.

Malaria Review Meeting

A Seminar and Review Meeting on Malaria was organised on 16th March at RMRC, Bhubaneswar by NAMP Experts, CDMOs, and other dignitaries of the State & Union participated in the same under the Chairmanship of Mr. S.K.Nayak, Secretary, Health & F.W., Govt. of India.

9.4 Awards

1. **Dr. B. Ravindran,** DD (SG) was awarded MOT Iyenger Award of ICMR for work excellence in Filariasis for the year 2001.

9.5 Human Resource Development

1. **Mr. Bibhuti Bhusan Swain** of Dept. of Applied and Industrial Microbiology, School of Life sciences, Utkal University did his M.Sc dissertation on "Association of Tuberculosis and HIV seropositivity amongst hospitalized patients" under the guidance of Dr. G.P.Chhotray
2. **Ms. Mamatamani Samal** of Dept. of Applied and Industrial Microbiology, School of Life sciences, Utkal University did her M.Sc dissertation on "HIV seropositivity among the tuberculosis patients of Orissa: A hospital based pilot study" under the guidance of Dr. G.P.Chhotray
3. Training was imparted for One week (17-21 February 2003) for Laboratory Diagnosis of Hemoglobinopathies to Dr.L.Mishra, I/C Pathology, District Headquarter Hospital, Boudh, Orissa.
4. **Miss Suswapna Patnaik** student of B.Tech, Biotechnology from Vellore Institute of technology, Vellore was exposed to laboratory techniques from 10th May to 9th June 2003 in Immunology laboratory of RMRC, Bhubaneswar.

RMRC Foundation Day Celebration

25. Participated in 28th Annual Conference of the Indian Society of Human Genetics held at Jammu on 7-9th February, 2003.

26. Participated in the National Seminar on Tribal Health and Nutrition in India Biocultural Dimensions held during 25-26th March 2003, Bhubaneswar and presented a paper entitled "Hereditary Common Hemolytic Disorders, Alcoholism and Tribal Health Culture in Two Major Tribes of Sundargarh District of Orissa".

27. Participated in 28th Annual Conference of the Indian Society of Human Genetics held at Jammu during 7-9th February 2003 and presented a paper entitled " Intra-group genetic variations in breeding isolates of Bhuyan and Kharia tribes in Central East India.

Dr. G.P. Chhotray

28. Attended national Seminar on tribal health and Nutrition in India on " Bio-cultural Dimension" at Utkal University, Bhubaneswar from 25th-26th March , 2003.

29. Participated and chaired a session in the Symposium on Immunoparasitology held at Bhubaneswar in November 2002.

30. Invited as guest speaker to the National seminar on tribal health and nutritional disorders organized by Dept. of Anthropology, Utkal University, Vanivihar in March 2003.

Dr. SSS Mohapatra

31. Participated in a State level workshop on NIDDCP sponsored by GOI, UNICEF at Bhubaneswar during 17-18th October 2002.

32. Participated in International Symposium on "Challenges in Malaria and Prospects for Research" at New Delhi from 29th-31st October, 2002.

Dr. N. Mohapatra

33. Participated in International Symposium on "Challenges in Malaria and Prospects for Research" at New Delhi from 29th-31st October, 2002.

Dr. B.V. Babu

34. Participated in a subsidiary meeting of TAG on social mobilization and community education in lymphatic filariasis control, held at ICMR headquarters, New Delhi on 26th November 2002, as its member.

35. Attended National Seminar on Tribal Health and Nutrition in India: Bio-Cultural Dimensions, held at Dept. of Anthropology, Utkal University, during 25-26, March 2003.

36. Attended national Seminar on tribal health and Nutrition in India: Bio cultural Dimension. At Utkal University, Bhubaneswar during 25-26, March 2003.

Dr. A Mohapatra

37. Presented a paper on " Micro and Macro Reproductive Health components among the tribes in India" at 2002 Annual meeting of Population Association of America (PPA), May9-11'2002 in Atlanta, USA.

Dr. M.K.Beuria

38. Attended training on "Safety aspects in the research applications of Ionizing Radiations" at Bhaba Atomic Research Centre, Mumbai during 23rd September 2002 to 1st October 2002.

39. Attended Contining Medical Education Programme in Immunology conducted by RM RC, Bhubaneswar on 26th November 2002.

40. Attended XXIX Annual Meeting of the Indian Immunology Society and symposium on Immunoparasitology, and presented a paper entitled "Asymptomatic amicrofilaraemia represents a stable group in Wuchereria bancrofti endemic area" held at Bhubaneswar from 27-29 November 2002.

Dr. A.K.Satapathy

41. Visited University of Leiden Medical Centre, Netherlands for training in flow cytometer and intracellular training for cytokine from 23 Sept. 2002 to 22nd October 2002.

42. Attended a two day seminar on "Application of Radioisotopes and Radiation Technology" from 21-22 November 2002 at Institute of Physics, Bhubaneswar.

43. Attended International Conference on Alternatives to use of animals in Research and Education from 18-20th February 2003 held at New Delhi.

44. Attended CME Workshop on Immunology, RMRC, Bhubaenswar on 26th November 2002.

45. Presented a paper entitled "A study on inflammatory cytokines in human bancroftian filariasis" XXIX Annual Meeting of Indian Immunology Society, 27-29 Nov. 2002 at RMRC, Bhubaneswar.

Dr. G. Bulliyya

46. Participated in a state level workshop on National Iodine deficiency disorders Control Programme- GOI-UNICEF Project held on 17-18th October 2002 at RMRC, Bhubanewar.

47. Attended IX Asian Congress of Nutrition and presented a paper entitled "Study on nutritional profile of the elderly Kondhs: a major primitive tribal community of Orissa held at Ashoka Hotel, New Delhi, between February 23-27, 2003.

48. Attended National Seminar on Tribal Health and Nutrition in India: Bio-cultural Dimensions and presented a paper entitled 'nutrition scenario of tribal population in Orissa: Time trends, held at Department of Anthropology, Utakal University, Bhubaneswar on March 25-26' 2003

49. Attended training Course on techniques for assessment of nutritional anaemias held at National Institute of Nutrition, Hyderabad from 2-13 December 2002.

Dr. M.R.Ranjit

50. Attended the CME programme in Immunology and participated in the International Symposium on Parasite Immunology organized by Indian Immunology society,at RMRC, Bhubaneswar from 26th to 29th November 2002.

51. Attended International symposium on modern trends in malaria and presented paper on "Genetic structure of P.falciparum isolates from Orissa, India. Organized by Dept. of Biotechnology, AIIMS, New Delhi from 13th to 15th February 2003

52. Attended the CME programme in Immunology and participated in the symposium on Parasite Immunology held at Bhubaneswar in November 2002.

Dr. BB Pal

53. Attended 29th annual conference of the Indian Immunology Society and symposium an Immunoparasitology, 27-29th November 2002.
54. Invited as Chief guest in the Annual function of Zoology seminar in Kendrapada College and delivered a talk on "HIV infection in Orissa more than a decade's view" on 21st August 2002.
55. Was invited as chief Guest to talk on "HIV/AIDS" on the occasion of National Science Day on 28th February 2003 in the Zoology Department of Nayagarh College, Nayagarh.

Dr. A.S Kerketta

56. Attended a training programme on Verbal Autopsy for RGI Surveyors at Institute of Health Systems, Hyderabad from 16-21, December 2002

Dr. B.P.Dash

57. Attended the CME programme in Immunology and participated in the International Symposium on Parasite Immunology organized by Indian Immunology society, at RMRC, Bhubaneswar from 26th to 29th November 2002

Dr. A.S. Acharya

58. Attended Advanced Orientation Workshop on Information and communication at NIOH, Ahemdabad from 25-27 June 2002.
59. Attended a training programme on Verbal Autopsy for RGI Surveyors from 16-21, December 2002 at Institute of Health Systems, Hyderabad.

Dr. P.K.Sahoo

60. Attended second Winter School on Immunology at Goa from 15-21st December, 2002.
61. Presented a paper entitled "Human Bancroftian Filariasis- Protective role of antibodies to Abundant Larval Transcript (ALT-1)", XXIX Annual Meeting of Indian Immunology Society, 27-29 Nov. 2002 at RMRC, Bhubaneswar.

Mr. B.R.Sahu

62. Presented a paper entitled "A role for IgA antibodies in Human Bancroftian Filariasis", XXIX Annual Meeting of Indian Immunology Society, 27-29 Nov. 2002 at RMRC, Bhubaneswar.

Dr. B. Sahoo

63. Attended Advanced Orientation Workshop on Information and communication at NIOH, Ahemdabad from 25-27 June 2002.

9.7 Scientific facilities:

(A) Insectorium:

The insectorium facility is maintained at the Centre under Entomology Department by rearing of various stages of vectors used for lab studies. Cyclic colony of the following mosquito species are being maintained in our Insectary.

1. Aedes aegypti (black eyed Liverpool strain).
2. Anopheles stephensi
3. Culex quinquefasciatus

Cyclic colonies of different mosquitoes were maintained for conducting different experiments, such as development of different strains and species of filarial worms which will help in the selection of proper animal model, conducting bio-assays of different plant products for observation of its insecticidal properties. Training on mosquito rearing, identification of larvae and adult mosquitoes of different species was given to the Ph.D. student of Calcutta University, Kolkata.

(B) Animal House:

Animal facility in the Centre continues to be used under Immunology Department catering to all on-going research projects requiring animal experimentation. Currently M. couch, BALB/C mice, Guinea pigs are available for experimentation. Animal facility has been registered with CPCEA. All the projects concerning animal use/experimentation are discussed in duly constituted Animal Ethical Committee of the Centre and work progress review periodically by committee. The facility is well maintained with animal house attendant and other trained researcher. Animal house is maintained regularly with periodic inspection and health monitoring by veterinarian. Now a new animal house is being constructed to cater to large number of animals and better facilities. The periodic records are maintained by staff.

(C) Transport Facility:

Staffs are trained in different field study activities. Regularly 3 to 4 vehicles are available for field trips.

9.8 Budget and Extramural Grants:

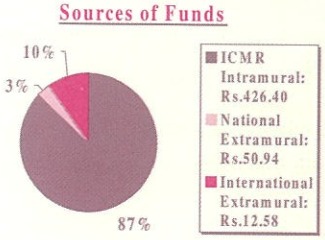
The total sanctioned Budget in respect of the Centre (Non-Plan & Plan) for the year 2002-03 are given below. (Rs. in lakhs)

1.	Pay and Pension	134.14
2.	TA & OC	90.50
3.	Equipment	135.95
4.	Capital	65.81
	TOTAL	426.40

The total expenditure made by the Centre for the year 2202-03 Rs.422.34 lakhs. Projects (Intramural & Extramural)

In total 18 nos of extramural projects were under taken at RMRC, Bhubaneswar in the year (2002-03) with a total extramural grant received during the year was Rs. 63.52 lakhs.

In year (2003-04), total ICMR extramural budget allocation of Rs 194.25 lakhs (both Plan and Non-Plan) received so far. Extramural grant received for 2003-04 so far are Rs. 33.40 lakhs.



9.9 Members of the 17th Scientific Advisory Committee

1.	**Dr.D.S. Agarwal** B-24, Swasthya Vihar Delhi 110 092	**Chairman**
2.	**Dr S. Pattnayak** B-91, Swasthya Vihar Delhi 110 092	**Member**
3.	**Dr.R.C. Mahajan** House No:276, Sector-6 Panchkula, Chandigarh	**Member**
4.	**Dr Bimal C. Kar** (Retd. Prof. of Medicine, V.S.S.Medical College) Medical Aid and Research Centre BURLA 768 017, Sambalpur, Orissa.	**Member**
5.	**Dr Sarita Agarwal** Addl. Professor, Deptt. of Genetics, S.G.P.I.M.S., Raebareli Road, Lucknow 226 014	**Member**
6.	**Dr S.P.Mukhopadhyay** Prof. & Head Health Care and Hospital Management, Deptt. of PSM, Indian Institute of Social Welfare and Business Management Management House, College Squire (W), Kolkata-73	**Member**
7.	**Dr Arvind Pandey** Director Institute for Research in Medical Statistics, Ansari Nagar, New Delhi 110 029	**Member**
8.	**Dr Sandeep Basu** Director National Institute of Immunology 22, Sham Nath Marg, Delhi - 110 054	**Member**
9.	**Director** Health Services Directorate of Health Services Heads of the Dept. Building Bhubaneswar 751 001	**Member**
10.	**Director,** Natrional Anti Malaria Programme 22, Sham Nath Marg Delhi 110 054	**Member**
11.	**Dr G.C.Mishra,** Director National Center for Cell Sciences MCCS Complex, Gaurhind Pune 411 007	**DG's nominee**

12. **Dr.S.K. Kar** — **Member Secretary**
Director
Regional Medical Research Centre
Bhubaneswar 751 023
ICMR Representatives

13. **Dr.Lalit Kant,** — **Sr.DDG,**
Indian Council of Medical Research
Ansari Nagar, New Delhi 110 029

14. **Dr.Dipali Mukherjee,** — **Chief ECD**
Indian Council of Medical Research
Ansari Nagar, New Delhi 110 029

15. **Dr.Rashmi Arora,** — **DDG, ECD**
Indian Council of Medical Research
Ansari Nagar, New Delhi 110 029

Invited Members

16. **Dr.S.K. Bhattacharya**
Director,
NICED, P-33, CIT Road
Scheme XM, Beliaghata
Calcutta 700 010

17. **Dr.M.D. Gupte**
Director
National Institute of Epidemiology
Chetput, Chennai 600 031

18. **Dr.S.K. Subbarao**
Director
Malaria Research Centre
22, Sham Nath Marg, Delhi 110 054

19. **Dr.Vijay Raghavan**
Officer-in-charge, NNMB
National Institute of Nutrition
Jamai-Osmania, Hyderabad 500 007

9.10 Human Ethical Committee:

1. **Justice (Mrs.) A.K.Padhi** — **Chairman**
Former Judge, Orissa High Court
10, Bhasakosh Lane
Nimchouri, Cuttack-753 002

2. **B.Tripathy** — **Member**
Retd. Prof. of Medicine
Saradiya Mission Road, Cuttack-753 001

3. **Dr.(Mrs.)P. Mohanty Hejmadi** — **Member**
Ex-V.C. Sambalpur University
GM-8, VSS Nagar
PO: Vani Vihar, Bhubaneswar-751 004

4. **Mrs.Kasturika Pattanayak** — **Member**
Ex-Chair Person

	Social Welfare Board, Govt. of Orissa 1, Lewis Road, Bhubaneswar	
5.	**Dr.(Mrs.) Manorama Das** C/o.Prof. G.C.Das Santiniketana Mathasahi, Cuttack	**Member**
6.	**Dr.P.K.Acharya** Chief Medical Officer Capital Hospital Bhubaneswar-751 001	**Member**
7.	**Father Tony** Principal Loyala School, Chandrasekharpur Bhubaneswar-751 023	**Member**
8.	**Dr.S.K.Kar** Director, RMRC Bhubaneswar	**Member-Secretary**

9.11 Animal Ethical Committee:

1.	**Dr.S.K.Ray** Professor & Head Dept. of Veterinary Medicine Orissa College of Animal Husbandry & Veterinary Sciences, O.U.A.T. Bhubaneswar - 751 001	**Chairman**
2.	**Dr.G.B.N. Chainy** Prof. & Head, Dept. of Zoology Utkal University, Vani Vihar Bhubaneswar - 751 004	**Member**
3.	**Prof. P.C.Supkar** Institute of Life Sciences Bhubaneswar-751 023	**Member**
4	**Fr. Abrham S.J.** Director Xavier Institute of Management Bhubaneswar-751 023	**Member**
5	**Mr.N.R.Mansingh** Inspector, SPCA C/o.CDVO office Puri - 752 002	**Nominee of the** CPCSEA,
6	**Dr.M.K.Das** DD (Sr.Gr.) RMRC, Bhubaneswar	**Biological Scientist**
7.	**Dr. B. Ravindran** DD (Sr. Gr.), RMRC,Bhubaneswar	**I/C Animal facility**
8.	**Dr.(Mrs.) N.Mohapatra** AD, RMRC, Bhubaneswar	**Biological Scientist**
9.	**Dr.S.K.Kar** Director RMRC, Bhubaneswar	**Convenor**

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