Annual Report 2001-02

Regional Medical Research Centre

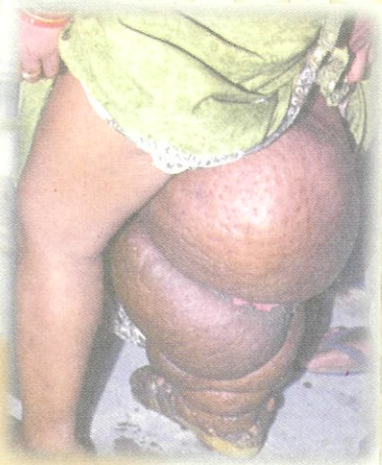
Bhubaneswar

Annual Report

2001-02

Regional Medical Research Centre
(Indian Council of Medical Research)

Bhubaneswar - 751 023
Orissa, India



PREFACE

The Centre focused its major research activities on priority issues of lymphatic filariasis, malaria, haemoglobinopathy disorders and tribal health. Research was addressed on basic, applied and operational areas with the objective of developing new products, diagnostics or knowledge and strategies that can be applied. Efforts were made to strengthen areas to develop strategies for control and prevention of filariasis and malaria and non-communicable diseases like haemoglobinopathy disorder where Orissa shares high prevalence in the country. Researchable issues pertaining to priority areas of health of this region were taken-up. Since tribal health is an important area of concern, several studies were addressed to generate database on areas like nutrition and morbidity pattern and formulate control strategies that can have field applicability. Human Resource Development was also undertaken to train professionals in respective fields. Several staff and SRFs of Centre were enrolled for Ph.D. programme, University M.Sc. students for dissertation work and other medical / paramedical workers trained with technologies during the period.

For dissemination of scientific informations, the library activities were strengthened during the year with additional facilities. Educative materials on various diseases were prepared in the form of booklets and pamphlets for exhibition/ distribution.

The interaction with State Health Department was strengthened in the form of consultancy that was provided in important areas as well as assistance received.

Currently, the staff strength is 102 with 98 of them in position. This includes 16 scientists with various expertise who cater to accomplish the objectives. The Centre made all out efforts to encourage scientists and staff in pursuing the output. The scientists have made excellent contribution in terms of publications in national and international journals. Apart from 20

publications during the period 2001-02, staff spent considerable time in attending meetings, symposia, conferences and other training activities. Besides updating the existing facilities like insectarium, central instrument lab, animal house and library, radioisotope laboratory was initiated as an additional facility.

During the year, the scientists of the Centre have also provided services in various fields. New OPD facility on lymphatic filariasis was initiated at Capital Hospital, Bhubaneswar by this center on twice a week basis from June 2001. During flood, as requested by the State Health Department, the Centre had undertaken diagnostic services in diarrhoeal disorders, malaria and leptospirosis, besides several other surveys were also undertaken. Several diagnostic referral cases from Govt./Govt. recognized health facilities on haemoglobionopathy disorders were investigated by this Centre.

More than 30 research projects including extramural projects were taken up during the period. Weekly journal clubs and seminars were organized regularly by this Centre where invited experts also participated. Symposium on AIDS and other areas were organized. The Centre also organized national and international conferences during the year.

During the year 2001-02, Council provided annual budget of Rs. 353.07 lakh and during 2002-03 the Council has provided almost Rs.2.00 crore budget. An additional Rs.93.69 lakh was generated as extramural project grants from other sources this year.

The Centre received sanctions for construction of an Animal House, Guest House, Hostel, Auditorium and one time repair of building and staff quarters. The funds for the purpose were deposited with CPWD and construction work for same areas have already been initiated.

The scientists have made continuous efforts and contributed significantly to promote scientific research in the Centre. I sincerely thank the staff for their endeavour and contribution. I am also thankful to State Health Department and local agencies for their co-operation. I express my deep gratitude to Council for their continuous administrative support, encouragement and guidance. I hope, with all round support the Centre will continue its endeavor to achieve its goals.

S.K.Kar

DIRECTOR

Highlights of Achievements (2002)

Significant progress on Filariasis, the major thrust area of the Centre and other areas such as Malaria, Diarrhoeal Diseases, haemoglobinopathies and Tribal Health were made in this year. Pertinent issues on filariasis like understanding the role of protective immunity and natural history of disease in endemic population were addressed that could eventually assist in vaccine development against the disease. Several antigenic molecules were Identlfled and were demonstrated to have protective role. The purified filarial antigen, Dssd1 was demonstrated to be a biologically relevant antigen and antibody responses to the carbohydrate moiety in this fraction appeared to be crucial for induction of protective antibodies. IgA antibodies directed towards the surface of filarial worms were shown to be crucial in immunity in human filariasis. Molecule(s) in the range of 66 kDa and 200 kDa were found to induce protective IgA in putatively immune subjects. The susceptibility to filarial infections (in males) was correlated with decreased induction of filarial specific IgA. Investigation in experimental filariasis has indicated the role of antibodies to T-independent antigens and macrophage derived nitric oxide in anti-microfilarial immunity. Longitudinal studies conducted in Mf carriers and uninfected endemic normals indicated significantly higher conversion to disease development in endemic normals than in the infected population. Clinical trials with various inexpensive regimens in lymphoedema were undertaken. Preliminary results indicated reduction in early oedemas. Acceptability and cost efficacy of different drug regimen are being studied. The evaluation of mass drug administration against filariasis indicated the need for optimizing the control strategies. Orissa is highly endemic for malaria and studies undertaken in sampled household of various geographical regions indicated distribution pattern of sibling species of *An. culicifacies* (B & C) and *An. Culicifacies* C was more prevalent where malaria incidence was more. Situational analysis of urban malaria are being assessed. Subjects putatively immune to Malaria produced significantly high levels of antibodies to peptide sequences in the aminoterminal regions of malarial phosphoproteins. There was an age dependant increase in these antibodies in the endemic population. Studies on G6PD deficiency, sickle cell anaemia and thalassaemia amongst various tribes of Orissa have shown significant differences in their prevalence between different primitive tribes. Intervention has been initiated against intestinal parasites, scabies, cholera, Vitamin deficiency and nutritional anaemia in tribal population of Orissa. Nutritional studies amongst primitive tribes revealed that anaemia is predominant among elderly primarily due to deficiency of dietary intake of nutrients as per requirement. The related factors are evaluated to help planning future intervention strategy.

STAFF POSITION AS ON 31.12.2002

DIRECTOR

Dr.S.K.Kar, MBBS, M.D.

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.	Research Officer
Dr.B.P.Dash, M.Sc., M.Phil, Ph.D.	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
Mr.R.K.Das, M.Sc.	Research Assistant
Mr.A.S.Acharya, M.Sc., M.Phil, LL.B.	Research Assistant
Mr.S.C.Rout	Lab. Technician
Mr. T. Moharana	Lab. Assistant
Mr.R.N.Nayak, B.A.	Census Taker
Mr.H.K.Jena	Field Attendant
Mr.R.K.Hembram	Field Attendant

MEDICAL ENTOMOLOGY DIVISION

Dr.A.P.Dash, M.Sc., Ph.D., D.Sc.	Deputy Director (Sr. Grade) (Deputation to ILS, BBSR)
Dr.(Mrs.)N.Mohapatra, M.Sc., Ph.D.	Assistant Director
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.D.P.Hansdah, M.Sc.	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

HUMAN GENETICS DIVISION

Dr.R.S.Balgir, M.Sc. (Hons.), Ph.D.	Deputy Director
Dr. G. Bulliyya, M.Sc., Ph.D.	Senior Research Officer
Mr.B.Murmu, M.Sc., M.Phil.	Research Assistant
Mrs. G. Mallick, M.Sc.	Research Assistant
Mr. K. Dhal, B.A.	Census Taker
Mr.N.N.Pattnaik	Laboratory Attendant

SENIOR/JUNIOR RESEARCH FELLOWS

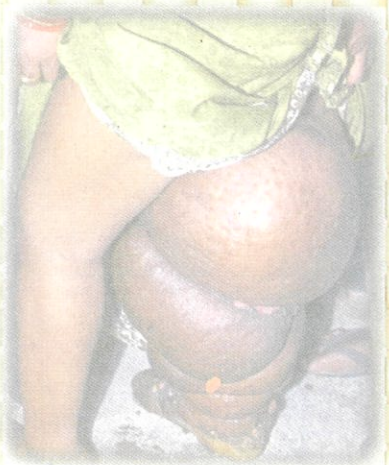
Mr.B.R.Sahoo, M.Sc., M.Phil.	Senior Research Fellow
Mr.A.N.Nayak, M.Sc., M.Phil.	Senior Research Fellow
Dr. Ratna Palit, MBBS	Senior Research Fellow
Mrs. Sunanda Garabadu, M.Sc.	Senior Research Fellow
Mr. Mahendra Panda, M.Sc.	Senior Research Fellow
Ms. Kalyani Rath, M. Sc.	Senior Research Fellow
Ms. Anamika Das, M.Sc.	Senior Research Fellow

LIBRARY & INFORMATION

Dr.B.Sahoo, MLISc., Ph.D.	Asst. Lib. & Inf. Officer

ADMINISTRATION

Mr.A.K.Mohapatra, B.A., LL.B.	Admin. Officer
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.



Directors' 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

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 Unit

Dr.S. K. Das, MBBS	Research Officer (Medical)
Mrs. S. Paikray	Asst. Research Officer
Mrs. Haraprava Sahu	Social Worker
Mr. D. K. Mohanty	Steno-cum-Office Assistant
Mr. Radhakanta Sahoo	Driver
Mr. Jugal Kishore Mohanty	Field Attendant

CONTENTS

1. ON-GOING STUDIES

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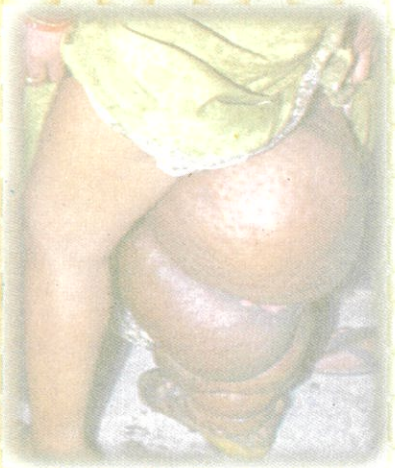


1. ON-GOING STUDIES

Studies on Filariasis

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

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

Status:
Extramural (DBT Funded)

Starting Date : July 2001

Closing Date : July 2004

Objectives:

1. Immunochemical characterization of Dssd1 and lipid antigens with potential for microfilariae clearance from infected animals.
2. Studies on antibody response to these antigens in "endemic normals" *vis-à-vis* infected population.
3. Studies on cytokine profiles induced by the specific antigens in order to understand the immune regulatory mechanisms.
4. To conduct longitudinal immune studies in filarial communities especially in endemic normal group.

Background Information and Progress:

Identification of antigens with different immune responses in infected and non-infected endemic individuals will be of great potential in understanding immunity in filariasis. Few filarial antigens are known with such properties. This center has reported two of them in this context – a glycoprotein surface antigen DssdI and lipid antigen. These antigens exhibited depressed antibody levels in infected (circulating filarial antigen, CFA positive) individuals irrespective of clinical and parasitological (microfilarial) status. CFA positive individuals exhibited depressed IgG levels to DSSd1 and individuals with high antibody levels were invariably CFA negative. Low IgG levels to DSSd1 are associated with CFA positivity irrespective of microfilaraemia and clinical status. Thus asymptomatic microfilaraemic individuals with antigen positivity exhibited low IgG levels similar to symptomatic (chronic filariasis with elephantiasis, hydrocele) or asymptomatic amicrofilaraemic individuals with antigenemia.

SDS-PAGE/ Western blot analysis of DSSd1 with various filarial sera was carried out. It showed that a high molecular weight band of approximately 210 kDa to be reactive only with antigen (CFA) negative sera but not with CFA positive sera (fig 1A). However few CFA positive sera who are DSSd1 antibody positive reacted weakly with DSSd1. No new bands were further detected. Dssd1 was found to contain 45 µg of carbohydrates (as glucose equivalent per mg. of protein). To determine the importance of glycan moieties in the antigenic reactivity, DSSd1 was exposed to mild periodate oxidation and then examined by western blotting. Periodate oxidation reduced in drastic reduction of DSSd1 recognition by CFA negative sera. CFA positive sera did not react with oxidized DSSd1 (fig1B).

Individual filarial sera with CFA positivity and negativity were checked in ELISA against native and periodate treated DSSdI. IgG levels in asymptomatic microfilaraemic carriers sera with CFA positivity were not affected by periodate treated DSSdI, CFA negative sera especially of endemic normals group exhibited very high loss in antibody levels (fig 2). The results suggest the Importance of carbohydrate epltopes In Dssdl (Glycans-Dssdl). CFA positive endemic individuals lack antibodies to Glycans-Dssdl. CFA negative Indlvlduals on the other hand have successfully elicIted antlbodles to Glycans-Dssdl. Active infection is thus linked with the lack of antibody response to carbohydrates. Inability to elicit antibodies to glycans-DSSd1 might be a key determinant for active filarial infection.

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

Status:
Intramural (DBT)

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 groups of children.
3. Immunolongitudinal follow-up of infection- free children.

Background information and progress:

Children due to high exposure and lack of immunity are most susceptible to many diseases, including filariasis. Although chronic filarial symptoms like elephantiasis are more frequently observed in adults, actual infection would have occurred years earlier in childhood it self.

About 565 members of children (<15 yr) were studied. Interestingly, although MF prevalence was 6.54%, that of antigenemia was 32.03%. Majority of antigenemia was detected in asymptomatic amicrofilaraemic (endemic normal) children. Almost 25% of 466 asymptomatic amicrofilaraemic children were found to be circulating filarial antigen positive (Og4C3) emphasizing the severity of infection in young children.

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

Status:
Intramural

Starting date : January 2002
Closing date : January 2005

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

The objectives of the project are:

1. To evaluate 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 "immune" individuals (infection-free) in the two regions.

Background information:

The main theme of this project is to find out how development of immunity (acquired resistance) to filariasis varies depending upon the endemicity of regions. In general, to understand the impact of endemicity on human anti-filarial immune response.

Progress:

About 80 individuals from a low-endemic region were studied. None was found to be microfilaraemic and elephantiasis. Acute filariasis and hydrocele cures were 8 and 1 respectively. Antifilarial IgG antibodies were detected in 80% cases. Antibodies to filarial surface antigen DssdI and lipid were also measured. It is of particular interest to note that Og4C3 antigen (circulating filarial antigen) was detected in 60% of normal individuals (n=60) of this low endemic region. This is in sharp contrast with the results obtained in high endemic region (Khurda district) where normal individuals have antigenemia rate upto 35%.

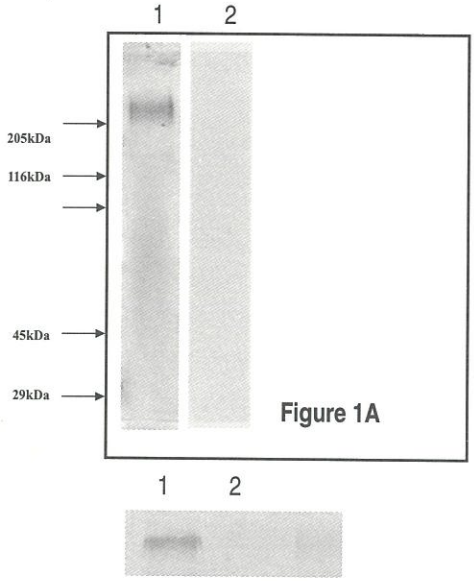


Figure 1B

Fig. 1 -

Non reducing SDS-PAGE/ Western blot, showing immunorecognition of DssdI antigen by IgG from filarial sera. A. lane 1- CFA negative sera, lane 2- CFA positive sera. Pooled sera were made from 30 individuals in each group. The migration of the standards is shown on the left. B. Immunorecognition of native (lane-1) and periodate treated (lane 2) DssdI by CFA negative sera.

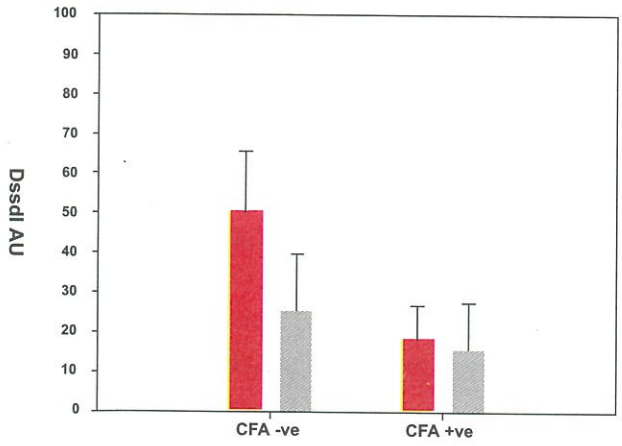


Fig.2. -

IgG reactivity to native (■) and periodate treated (■) DssdI in CFA positive and CFA negative sera (1:200) as measured by ELISA. Data expressed as antibody unit and represents the mean and SD of 30 individuals per group, 't' test - $p < 0.01$ in CFA negative group for native versus periodate treated DssdI.

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

Investigators:

Dr. B. Ravindran, P.I., Dr. A. K. Satapathy, Dr. P. K. Sahoo, Dr. M. C. Mohanty & Mr. B. R. Sahoo.

Status:

Intramural

Starting date : January 2002

Closing date : December 2004

Objectives:

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

Introduction:

Putatively immune endemic normals (EN) and patients with chronic filarial disease (CH) such as hydrocele and/or lymphedema represent two poles of the clinical spectrum of human lymphatic filariasis. Curiously however, the immune response phenotype in both these two groups have been found to be essentially very similar, the exception being CH patients with active filarial infection (demonstrable by circulating Mf and/or filarial antigens, CFA). Endemic normals and the vast majority of CH cases without active infection display immunological hyper-reactivity characterized 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 Mf 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 for 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.

Results:

Since filarial IgA levels have not been compared between EN and CH cases by previous investigators, initially a panel of 20 sera samples collected from CH cases and EN were tested for quantifying different isotypes of filarial specific immunoglobulins. The sera were tested for reactively to Fil.Nat and probed with different second antibody conjugates as shown in Fig. 1a. As expected there were no significant differences between the two groups when probed with anti-human Ig (polyvalent), anti-human IgG

or anti-human IgM conjugates. However filarial IgA was found to be significantly more in EN category in comparison to CH cases. Increased IgA levels were found to be an unique feature of only EN cases since the other three clinical categories viz., AS, CR and CH were found to have comparable levels of IgA and the levels in EN were significantly more than the other three groups (Fig. 1 b). Since these observations were novel and have not been recorded earlier, it was of immediate interest to investigate if the IgA are directed towards protein (Fil.Pro) or carbohydrate (Fil.Cho) epitopes of adult stage filarial parasites. Figs 1 c and 1 d reveal very similar reactivity to Fil. Pro and Fil.Cho indicating that filarial IgA are directed towards both protein and carbohydrate epitopes. Crucially, the IgA levels in EN cases were significantly more than the other three groups when tested with Fil.Pro or Fil.Cho also (Fig 1 c & 1 d).

When the sera samples were classified according to infection status disregarding presentation of symptoms, subjects with current infection (as shown by presence of Mf and/or CFA) were found to posses significantly less filarial IgA compared to those without active infection (Fig 2a and 2b). Similarly, disregarding infection as well as symptoms, when the samples were classified only according to gender, filarial IgA were found to be significantly more in females than in males (Fig 2 c); more interestingly, when the sera were classified according to presence/absence of infection and disease, significantly more IgA antibodies were found in females than in males in each of the three categories (Fig 2 d).

Analysis of 218 sera collected from all age groups indicated that levels of Filarial IgA appearing in younger age groups (<20 years) are sustained and persist without any significant change in all the higher age groups (Fig 3 a). Since a protective role for IgA and eosinophils have been demonstrated in Schistosomiasis, the relationship between filarial IgA levels and absolute eosinophil counts were studied in 50 subjects/ patients without current infection (CFA negative) – a very significant direct association was observed between the two parameters (Fig. 3 b).

The filarial IgA reacting to the surface of adult worms was studied by Immunoperoxidase assay using cross-sections of adult worms and scoring for reactivity to epicuticle and cuticle. The IgA binding to surface and internal structures could be delineated by this assay. Significantly high prevalence of IgA antibodies to the surface could be detected in endemic normal subjects in comparison to Mf carriers and patients with chronic disease (Fig. 4). These observations along with the association between IgA levels and eosinophilia are significant since human eosinophils are known to contain high affinity Fca receptors and eosinophil degranulation is an important effector mechanism against systemic helminths.

Fig 1 :

a: Distribution of filarial Immunoglobulin isotypes in EN – Endemic Normals (n=20) and CH- chronic filarial disease (n=20) against Fil.Nat and probed with anti-Human Polyvalent-Ig, anti-human IgG, anti-Human IgM and anti-Human IgA; Mean ELISA units ± SEM; 't' test : EN vs CH, P<0.001 for IgA.

b: IgA antibodies to Fil.Nat in clinical spectrum of filariasis: in EN – Endemic Normals (n=53), AS- microfilaraemic, asymptomatic subjects (n=43); CR- asymptomatic amicrofilaremic subjects with infection (n=41) and CH- (n=53); Mean ELISA units ± SEM; 't' test: EN vs CH, P<0.001; EN vs AS; P<0.001, EN vs CR, P<0.001.

c: IgA antibodies to Fil.Pro in clincial sepectrum: EN (n=21), AS (n=13), CR (n=16) and CH (n=36). Mean ELISA units ± SEM; 't' test : EN vs CH, P<0.001; EN vs AS; P<001, EN vs CR, P<0.001 ; CH vs AS, P<0.01.

d: IgA antibodies to Fil.Cho in clinical spectrum: EN (n=14), AS (n=13), CR (n=12) and CH (n=32); Mean ELISA units ± SEM; 't' test : EN vs CH, P<0.05; EN vs AS; P<0.05; EN vs CR, P<0.05.

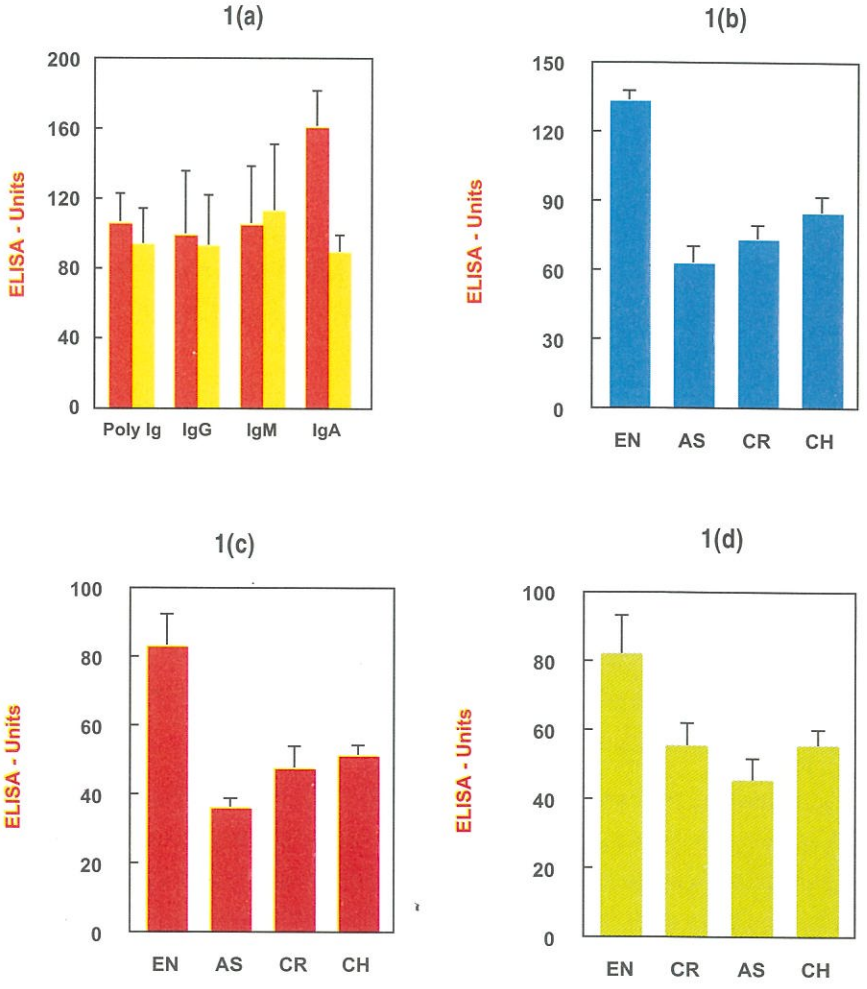


Fig 2 :

Association of filarial IgA levels with infection status and gender:

a) Association between CFA and IgA: Sera of CFA positive (n=122) or negative (n=90) cases were tested for IgA ; Mean ELISA units ±SEM; 't' test: P=0.0007.

b) Association between microfilaraemia and IgjA: Sera of Mf positive (n=43) or negative (n=165) cases were tested for IgA; Mean ELISA units ±SEM; 't' test: P=0.00086

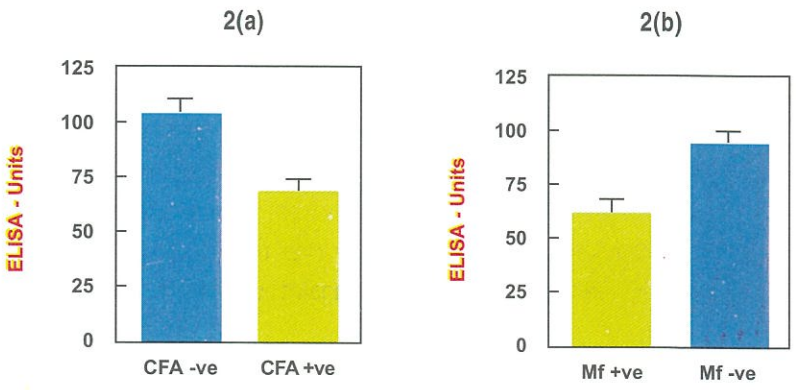
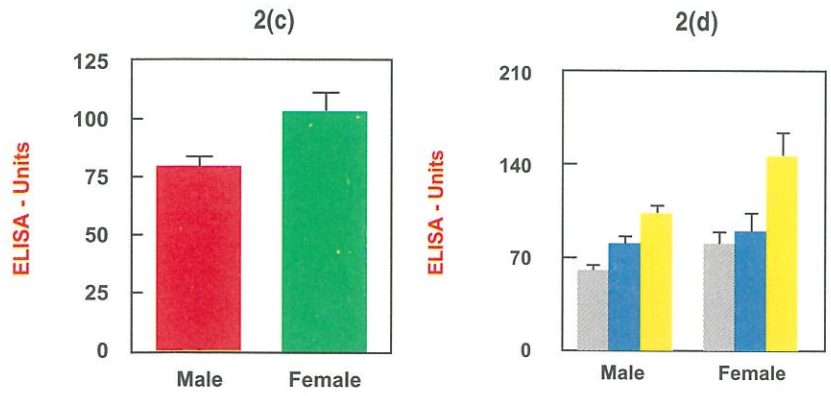


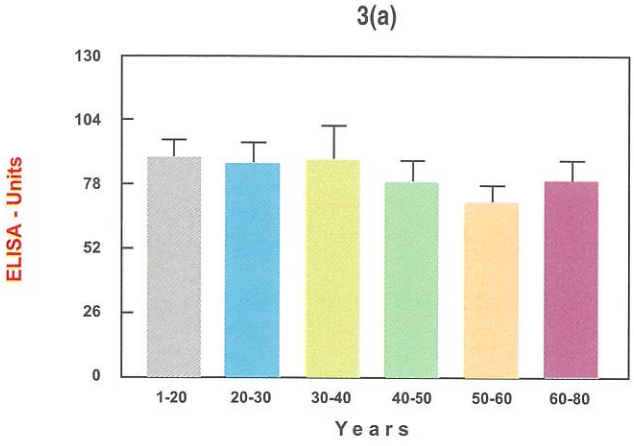
Fig 2 :



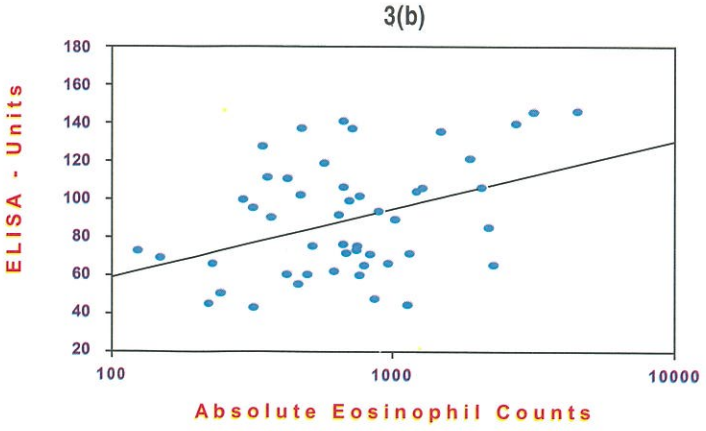
c) Association between gender and filarial IgA levels: Sera of 144 males and 73 females; Mean ELISA units ±SEM; 't' test: P=0.0009.

d) Association between Gender and filarial IgA in 3 clinical groups: Males and females of group (A) - Infection +ve and Disease –ve (open bars – 59 males and 32 females); group (B) - Infection –ve and Disease +ve (hatched bars – 40 males and 12 females); group (C) – Infection –ve and Disease –ve (closed bars- 38 males and 27 females) were tested for IgA levels; Mean ELISA units ±SEM; 't' test : males vs females, in group A, P<0.01; in group B, P<0.02: Males, group B vs group C, P<0.01; group A vs group C, P<0.001; group A vs group B, P<0.01: Females, group A vs group C, p<0.001; group B vs group C, P<0.05.

Fig 3:



a) Prevalence of filarial IgA antibodies in age stratified cases of Bancroftian filariasis: (n=62 for 1-20 yrs, n=45 for 21-30 yrs, n=43 for 31-40 yrs, n=25 for 41-50 yrs , n=28 for 51-60 yrs and n=15 for (61-80yrs); Mean ELISA units ± SEM. No statistically significant difference was observed between the groups.



b) Relationship between IgA levels and Absolute Eosinophil Counts in Human Bancroftian Filariasis : IgA levels of EN (n=18), Tropical Pulmonary Eosinophilia (n=15) and CH – patients with lymphoedema/ elephantiasis (n=17) were tested for correlation with that of Absolute Eosinophil Counts in the same individuals. The IgA levels positively correlate with the Absolute Eosinophil Counts ; Coefficient of correlation, r= 0.446, P<0.001.

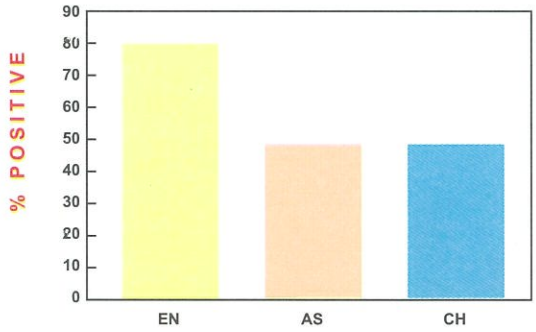


Fig.4:

Immunoperoxidase Assay: Prevalence of IgA antibodies to surface of adult filarial worms in endemic normals (EN; n=25), asymptomatic microfilaraemic subjects (AS; n=25) and patients with chronic disease (CH; n=25)

The current study is the first attempt to quantify filarial IgA and characterize protective immunity in clearly delineated clinical groups based on presence or absence of disease as well as infection. The study has revealed that decreased IgA levels is a feature in subjects with active filarial infection as well as in patients with chronic disease in comparison to putatively immune endemic normals. In the present study we have demonstrated significantly lower levels of filarial specific IgA in males than in females which presumably could be the reason for increased susceptibility of males to filarial infection/disease.

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

Investigators:

Dr B. Ravindran, Dr A. K. Satapathy, Dr P. K. Sahoo, Dr. M.C. Mohanty

Collaborators:

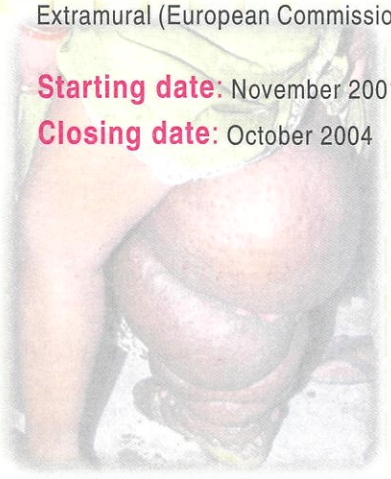
Dr. M. Yazdhanbakh, Leiden, Dr. R. M. Maizels,Edinburgh, Dr. R.Noordin, Malaysia, Dr. T. Supali, Indonensia

Status:

Extramural (European Commission)

Starting date: November 2001

Closing date: October 2004



Objectives:

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

Results:

One of the objectives of the project (objective No.4) was to evaluate the IgG4 dipstick assay developed by one of the partners of the EC project for Bancroftian filariasis. The assay has an IgG4 antibody detection system using a recombinant *B. malayi* antigen. The test has been found to be highly sensitive and specific for detecting *Brugia malayi* infection in human subjects. Since the antigen detection as

says currently available do not detect *Brugia malayi* infection, the dipstick assay was evaluated in Bancroftian Filariasis sera using CFA as a gold standard. The results are shown in Tables 1 & 2. The conclusions made from these testing are as follows: (1) The negativity of the dipstick assay correlated well with antigen detection assay. About 90% of CFA negative samples were found to be negative by IgG4 dipstick assay also. (2) However, the dipstick assay failed to detect subjects with cryptic infection in Bancroftian Filariasis. Unlike antigen detection assays only 13% of the cryptic infections (Mf –ve and antigen positive cases) could be detected by IgG4 dipstick assay indicating that the dipstick assay is sensitive enough only to detect Mf carriers and not subjects with cryptic infection and more crucially (3) Only about 44% of the microfilaraemic cases were found to be positive by IgG4 dipstick assay. The positivity of the assay in Mf carriers was not dependent on Mf density. The critical issue of possible mixed infections of W.bancrofti & B.malayi in some of the areas such as Siruli is being investigated by performing PCR assays.

Name of area	AS (n=94)	CH (n=85)	AC (n=18)	CR (n=36)	EN (n=48)
Gania	6/24	0/8	0/2	0/1	0/16
Siruli	13/21	0/19	1/13	-	0/5
Beleswarpatna	8/15	2/22	0/3	5/35	0/8
Kanapur	14/34	1/36	-	-	0/6
Jajpur	-	-	-	-	0/13
Total Positive (%)	**43.6**	**3.5**	**5.5**	**13.8**	**0**

AS: Asymptomatic Microfilariae carrier; CH: Chronic disease; AC: Acute disease; CR: Cryptic infection; EN: Endemic Normals

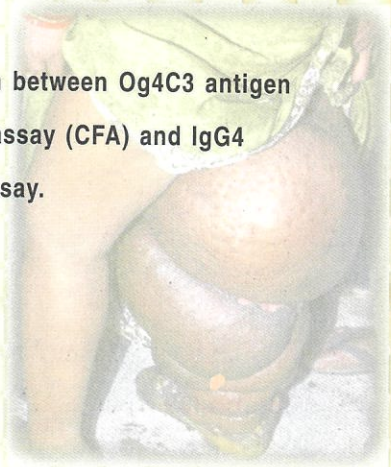
Table 1:

***Brugia malayi* dipstick testing in sera collected from Bancroftian filariasis. (No. positive/total sera tested) in different areas.**

Total No. (%)	CFA +ve No. (%)	CFA –ve No. (%)	Mf +ve No. (%)	Mf –ve No. (%)
Dipstick +ve 45	42(93.33)	3(6.67)	38(84.44)	7(15.56)
Dipstick –ve 207	99(47.83)	108(52.17)	52(25.12)	155(74.88)

Table 2:

Correlation between Og4C3 antigen detection assay (CFA) and IgG4 dipstick assay.



1.6. Identification of serum immunosuppressive factors in human filariasis

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

Status :
Intramural

Starting date : February 2002;
Closing date : January 2005

Objectives:

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

Results:

One of the objectives of the project is to study the relationship between IL-10, TGF-B and CFA levels with the degree of immunosupression. This involves identification of microfilarial carriers and/or CFA positive individuals in the community. About 180 subjects were surveyed in the endemic areas of Bancroftian filariasis. From this population, 3 ml of blood were collected from 41 subjects mostly from symptomatic cases and microfilariae carriers. 16 individuals with asymptomatic microfilaraemia, 3 with cryptic infection, 19 subjects with chronic disease manifestations and 3 subjects free of infection (endemic normals) were identified on the basis of parasitological, clinical evaluation and presence of circulating filarial antigens. The hyporesponsiveness state has been shown to be associated with the presence of active filarial infection (CFA). However it is not known if intensity of filarial infection could influence the degree of immunosuppression. To test this possibility the CFA units of all individuals with active infection were determined by Og4 C3 assay. Relatively low levels of CFA were found in a small percentage of lymphydema cases while higher levels of CFA were detected in asymptomatic cases. CFA units of individuals with asymptomatic microfilariaemia ranged from 6559 to >65000 units. Levels of IL-10, TGF-B will be quantified in the same set of sera with a view to correlate these two anti-inflammatory cytokines with antigen units.

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

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

Status :
Intramural

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.

Progress :

The prevalence of various clinico pathological profile was studied during the period 1989 – 93 and was followed up during 2000 – 2002 in one block each from Puri and Khurda district. During the follow-up the Mf rate, disease rate and progression of the disease was evaluated.

A total number of 3631 cases were examined initially from Satyabadi and Jatni block area. Out of these 2591 were available for follow – up clinical and parasitological examination. The Mf rate / disease rate were found to be 8.2 and 24.1% respectively during follow-up study as compared to initial data of 10.9% and 28.3% (Table 1.)

While studying the the disease course it was observed that 98.6% of the endemic normal remained as such while 4% had developed acute filarial disease manifestation. Similarly 60.3% of the asymptomatic microfilaraemic cases remained as such while 36.7% became normal and 2.3% and 0.6% developed signs of acute and chronic filarial disease respectively. The chronic cases during the follow-up study maintained the status (98%) without much progression of the clinical disease (Table 2).

Summary :

i. High Mf rate and disease rate in the initial and follow-up study indicates that the disease is endemic in the study area.

ii. The occurrence of all the clinical stages of the diseases from acute manifestation (lymphangitis, lymphadenitis, Adenolymphangitis) to chronic manifestations (elephantiasis, hydrocele) was observed.

iii. The clinical disease manifestation do not reflect the Mf positivity.

iv. Filarial associated manifestations like asymptomatic microscopic haematuria, TPE and Arthritis were observed that responded to antifilarial drugs.

v. The progression of the disease is slow.

vi. Identification of cross section of adult filarial worm in lymphnode and testicular tissue confirms aetiology and pathogenesis of the disease to be of filarial origin.

vii. Increased collagenisation observed in histopathological sections needs further study.

Table 1:

Comparison of Clinical spectrum of Filarial disease in two blocks studied.

Particulars	Satyabadi Block		Jatni Block	
	Initial (1989–1993)	Follow-up (1999–2002)	Initial (1989–1993)	Follow-up (1999–2002)
Population Examined (M / F)	2187 (1155/1032)	1700 (1059/641)	1444 (789/655)	891 (535/256)
Endemic Normal (Mf –ve, Dis –ve)	1253 (57.3%)	1196 (70.4%)	956 (66.2%)	557 (62.5%)
Mf +ve	201 (Wb = 143 Bm = 55, Mixed = 03)	99 (Wb = 85, Bm = 9, Mixed = 1)	195 (Wb = All)	114
AFD (Mf –ve)	539	237	150	107
CFD	194	168	143	113
Mf Rate	9.2	5.8	13.5	12.8
Disease RAte	33.5	23.8	20.3	24.7
MfD	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

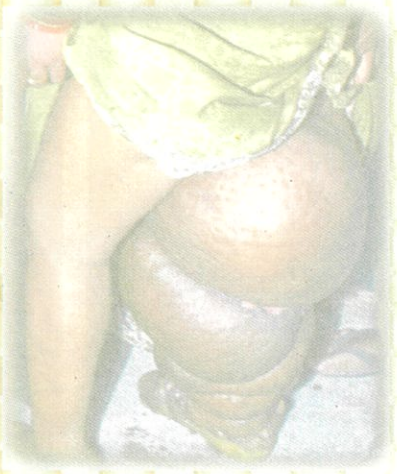
Mf rate	Initial vs. Follow-up
Satyabadi	Z = 3.902 (p<0.001)
Jatni	Z = 0.49 (p>0.05)
Total	Z = 2.80 (p<0.01)

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)

Table 2:

Clinical stage conversion during follow-up study

Category	Total		Category				
	Initial	Follow-up	Normal	AMC With No (%)	H/o AFD Mf + ve No (%)	H/o AFD Mf – ve No (%)	CFD No (%)
Endemic Normal Mf – ve / Dis. – ve	2232	1542	1521 (98.6)	16 (1.04)	0	5 (0.32)	0
AMC Mf + ve / Dis. – ve	356	305	112 (36.7)	184 (60.3)	0	7 (2.3)	2 (0.66)
H/o AFD With Mf + ve	40	16	3 (18.8)	2 (12.5)	11 (68.8)	0	0
H/o AFD With Mf – ve	676	473	112 (23.7)	0	0	332 (70.2)	29 (6.1)
Chronic	327	255	5 (5.5)	0	0	0	250 (98.0)
Total	3631	2591	1753 (67.7)	202 (7.8)	11 (0.42)	344 (13.3)	281 (10.8)



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

Investigators :

Dr. S.S.S Mohapatra,
Dr.A.S. Kerketta, Dr. S.K.Kar,
Mr. R. K Das, Mr. P.K. Jangid

Status:

Intramural

Starting date : March 2001

Closing date : December 2002

Objectives:

1. To reassess the earlier defined cohort population of asymptomatic microfilariae carriers and endemic normals for any clinical stage conversion, parasitological and antigen status after a period of 18 and 12 years respectively.
2. To correlate data on clinical stage conversion with Mf 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), available population of 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, 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.

The cohort of 163 AMCs identified in 1984 in a defined and yearly followed up till 1994 were reassessed in 2001-02. Out of these 163 only 109 (66.9%) were available in 2001 and followed up. Others could not be followed for similar reasons as for Ens (Table 2). In 2001 attempt was made to follow all the 163 cohort of AMC, but only 109 were traceable. They were examined for their latest conversion pattern and CFA status. The results showed that out of 109 AMCs, only 39 (35.8%) continued AMC status while 70 (64%) got converted to other clinical spectrum of filaria infection. These subjects had manifestations of clinical disease with mf (7), clinical disease with mf (5), and endemic normals (58). CFA test was carried out in all 109 subjects. Among 58 endemic normals 44 (76%) were found CFA +ve. (Fig. 2)

CONVERSION PATTERN OF COHORT OF EN & AMC FOLLOWED UP FROM 1983 TO 2001

	EN Group (n=144)	AMC (n=109)
1. Total converted	36 (25%)	70(64.8%)
2. Converted to Disease	22 (15.3%)	12 (11%)
a) Disease with mf	2 (1.4%)	7 (6.4%)
b) Disease without mf	20 (13.9%)	5 (4.6%)
3. Converted to AMC	14 (9.7%)	Converted to EN 58 (53.2%)
4. Not converted (Continued the status)	108 (75%)	39 (35.8)

It was observed that after a period of 18 years significantly higher propertion of cohort of AMCs manifested stage conversion as compared to Endemic normals. Conversion to clinical disease from each cohort was not significantly different. Frequency of CFA was sigficantly higher amongst AMCs than those who got converted to Disease. The CFA positivity amongst AMCs who are converted to ENs was significantly higher than ENs who did not show any stage conversion.

Fig -1

2001-2002

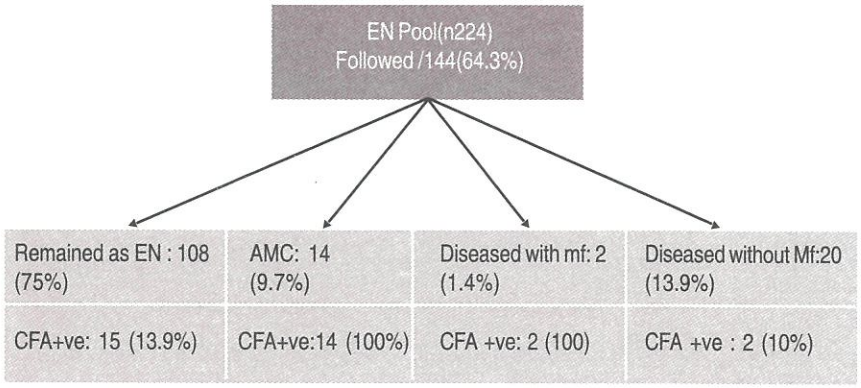
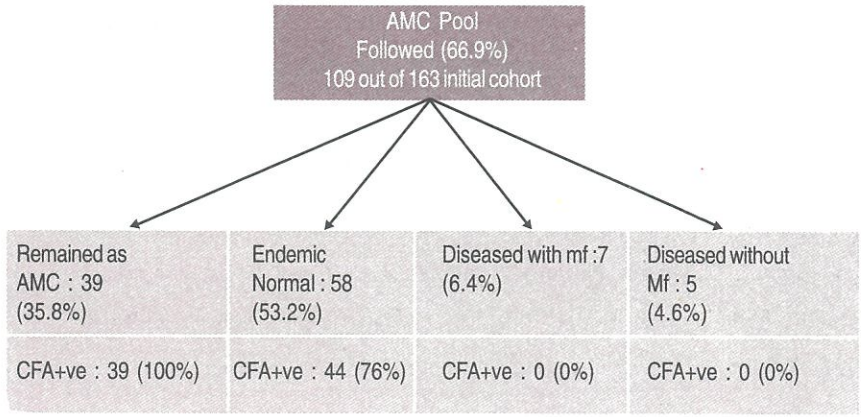


Fig -2

2001-2002



1.9 Morbidity control in Filarial Lymphoedema: Controlled clinical trial and treatment seeking behaviour and utilization of health care services in Khurda District of Orissa

Investigators :

Dr. Anna S.Kerketta, Dr.B.V.Babu , Dr. S.S.S.Mohapatra, Mr.R.K.Das, Mr. P.K.Jangid

Status :

Intramural.

Starting date : January 2001

Closing date : November 2003

Objectives:

1. To evaluate long term use of antibiotics with foot care in management of various grades of filarial lymphoedema.
2. Treatment seeking behaviour and utilization of health services of filarial lymphoedema and hydrocele.

Lymphoedema cases of various grades selected as per inclusion / exclusion criteria from endemic area were randomly allocated to different drug regimens i.e. oral antibiotic, DEC and local antibiotic along with foot care and pressure bandage and dosage administered. The cases in all the three groups were matched. All the cases were monitored daily for one week following drug day for any side effects. Limb circumference measurements were taken periodically and incidence of ADL attacks were also recorded.

A total of 19 cases were dropped from the study due to various reasons viz; side effects of the regimen, secondary infection followed by injury, ADL attacks and unwillingness of the patient. So far, 108 cases of Grade I, 120 of Grade II and 77 Grade III oedema cases were administered drug and followed up. First 3 months follow-up was completed in 35 cases of Grade I, 49 from Grade II and 20 from Grade III. The follow-up will continue for one year period and their limb circumference reduction, Mf status, ADL frequency will be compared amongst all three groups receiving 3 different regimens.

Socio-behavioural components:

To undertake socio-behavioural surveys, six villages were enumerated. The total population of these villages is around 4000 and out of them, 12% men and 5.8% women have chronic filarial manifestations. To understand various self-care practices followed among elephantiasis cases and to know the knowledge of patients on disease, 110 elephantiasis cases were selected and in-depth interviews were carried out. Similar survey will be undertaken among hydrocele cases. The survey tools for undertaking in-depth interviews with health system personnel were developed.

Programme of work for next year:

The regular follow up will be carried out after administering the rest round of the treatment and remaining surveys under socio-behavioural component will be taken up during the next year.

1.10 Advocacy for sustained treatment compliance of lymphatic filariasis control in Orissa, India.

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

Status :
Extramural (WHO / TDR)

Starting date : September 2001,
Duration: October 2002

Objectives:

To develop strategies to ensure sustained demand, supply and distribution of DEC and other drugs for the control of lymphatic filariasis.

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 levels attained.
3. To identify the factors at health facility level that effect coverage.
4. To document the factors that may influence coverage at the district level.
5. To identify the factors at state and national levels that may affect coverage.
6. To design appropriate strategies to address problems identified as a result of the foregoing objectives.

Progress:

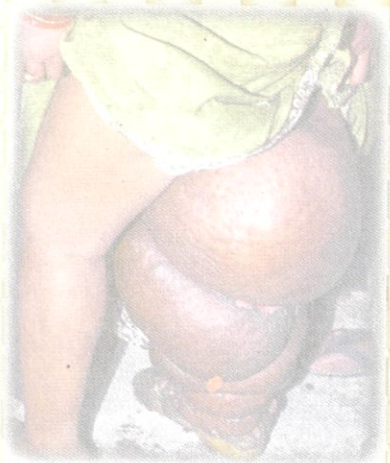
Mass drug administration programme and social mobilisation campaign in Orissa:

The mass drug administration (MDA) of DEC and albendazole has been implemented by Government of Orissa on 27th January 2002, with two following days for mop-up. Four districts of Orissa, namely Khurda, Puri, Ganjam and Balasore have been selected for implementation of MDA. 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. Various activities undertaken in these districts under two arms are shown in Table-1.

Activity	Moderate package in Balasore and Puri districts	Intense package in Khurda and Ganjam districts
Press Conferences, Feature Articles Writing and other press release productions Three radio Call-In programmes Advertising (Radio-TV-Newspapers)	✓	✓
Household Registration Booklets	✓	✓
Prize registration Slips **Ballpoint pens / Pencil** Khadi bags for volunteers Ziploc Plastic Bags **Ribbon flags** F-Day single sheet pamphlets Plastic Spoon for distribution Certificates *Lunch Invitation Card*	✘	✓
Schools Effort Single-sheets/with tear off, Balloons Filaria Riders Team T-Shirts Danglers Pocket Calendars	✘	✓
Posters	✓	✓
Community Miking Cinema Slides	✘	✓

Table-1

The differences in activities between two arms of COMBI



Area and Sampling:

The MDA has been implemented in four districts of Orissa. Many of the surveys have been undertaken in all the four districts; where as some qualitative surveys have been undertaken in two districts namely, Khurda and Puri. The sampling units 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. For household coverage survey and pre-intervention KAP survey, from each cluster, a minimum of 20 households were selected randomly. Care has been taken to include men and women as well as literates and illiterates, proportionately.

Surveys undertaken

Both quantitative and qualitative surveys have been conducted up to address various issues of mass drug administration.

Quantitative surveys:

- **Surveys on knowledge, attitude and behaviour towards lymphatic filariasis at community level**:

These surveys were undertaken before and after social mobilisation and MDA programme.

- ❑ Pre-intervention surveys have been undertaken in all the four district, i.e., Khurda, Puri, Ganjam and Balasore with a sample size of 1449.
- ❑ Post-intervention surveys have been undertaken in Khurda and Puri districts with sample size of 847.

- **Household coverage survey**:

Household coverage survey has been undertaken to assess the coverage and compliance, and other issues of compliance, among 14031 individuals of around 2500 households in 90 villages and 9 urban areas from all the four districts.

- **Side effects monitoring survey**:

This survey has been undertaken to study the nature and extent of side effects after consuming DEC and albendazole. This survey has been undertaken on 5th, 6th and 7th day of post MDA in 483 individuals who consumed drugs in Ganjam district.

Qualitative surveys:

- Focus group discussions (FGDs) with community members: 12
- FGDs with health workers: 8
- Semi-structured interviews with key-informants in villages: 52
- Semi-structured interviews with medical officers of primary health centres: 15
- Semi-structured interviews with district level programme officers 3
- Semi-structured interviews with private practitioners: 14
- Semi-structured interviews with diseased persons: 20
- Semi-structured interviews with non-governmental organisations: 9

Data management and analysis:

The data obtained in quantitative surveys were entered into computer through MS Excel, and analyses were done using SPSS for Windows V.8.0. The scripts of qualitative surveys were entered into computer by MS Word, and analyses were done by using Text Base Beta.

Results:

In Orissa, the MDA with DEC and albendazole of programme to eliminate lymphatic filariasis has been implemented in four districts with moderate compliance. The details of coverage rates (proportion of eligible population [above 2 years of age] who received the drugs) and compliance rates (proportion of eligible population who consumed drugs) are given in Table-1. The combined results show that 67.05% of people received drugs (coverage) and 41.57% of people consumed drugs (compliance). Of all the four districts, Balasore district recorded 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 very lower rates. The district headquarters town of one of the district recorded zero coverage and compliance.

The distribution of ninety villages (excluding urban areas), as per the coverage and compliance rates is shown in Fig.-1. 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 (25.48%) of people had not consumed tablets though they received tablets from health worker/drug distributor (Fig.-2).

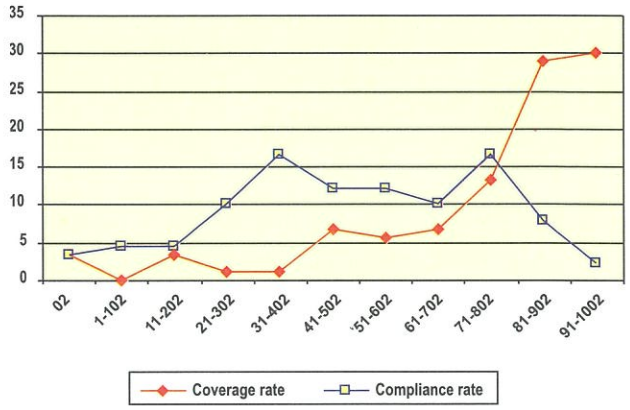
Table-1

Details Coverage and compliance rates among different sample groups

Category	Coverage % received drugs (coverage rate)	Compliance % consumed drugs (compliance rate)
Khurda district	55.76	33.15
Puri district	66.26	35.10
Balasore district	78.11	54.08
Ganjam district	69.92	46.51
Male	66.70	40.64
Female	67.44	42.58
Rural	76.12	49.12
Urban	44.93	23.11
Area with intense IEC	62.53	39.54
Area with moderate IEC	71.55	43.58
Total	67.05	41.57

Fig.-1

Distribution of villages (%) with regard to coverage and compliance rates



The present study probed for the reasons for 'not receiving' and for 'not swallowing' tablets at household level during household coverage survey, and their results are shown in Table-2 and Table-3, respectively. The most dominant 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 that 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 'away from the family', sick, felt unnecessary, etc.

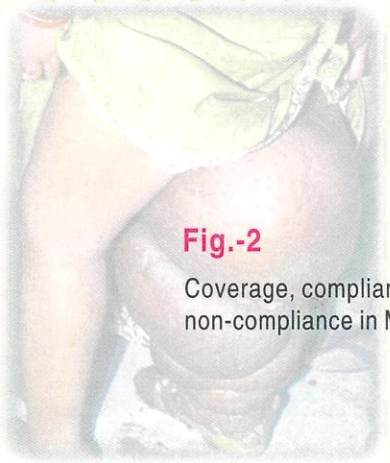
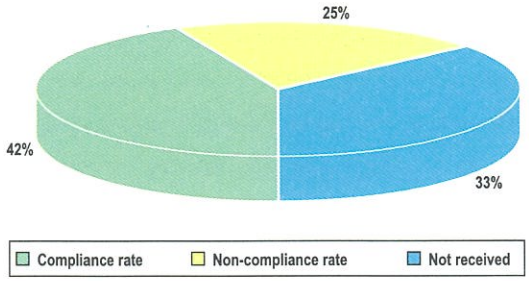


Fig.-2

Coverage, compliance and non-compliance in MDA



Reason	Number	Percent
Health worker or drug distributor has not visited their family	3454	75.8
Absent at the time of distribution	341	7.5
Felt unnecessary	303	6.6
Fear of side effects	199	4.4
Under age	91	2.0
Sick at the time of distribution	40	0.9
Pregnant at the time of distribution	32	0.7
No response/no reason	17	0.4
Others	79	1.7

Table-2

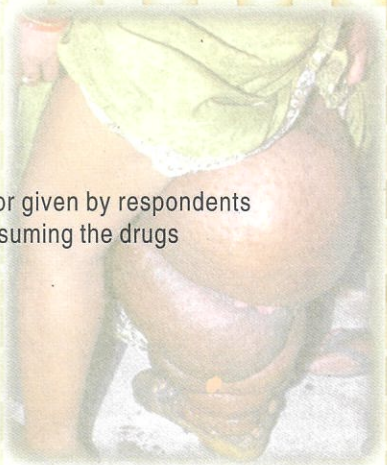
Reasons given by respondents for not receiving the drugs

Impact of social mobilisation package (COMBI): 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 (Fig.-3). It seems that there is no differential impact of the package (intense vs. moderate), though there is impact of the overall programme. The qualitative surveys indicated that people came to know about the programme through the radio and television advertisements. In some villages, posters played vital role in spreading the information. The additional inputs, such as school affords, ribbon flags, prizes, cycle riders teams, etc. that made in Khurda and Ganjam districts have not influenced much on either compliance or awareness of the people. 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. There is no impact of COMBI on the change of knowledge of the community also. Table-4 shows change in responses by community for a few questions in pre- and post-intervention KAP surveys. It indicates that there is no significant difference in the change of knowledge between pre- and post intervention periods. This indicates that COMBI or MDA programme has no impact on increasing the knowledge of community on lymphatic filariasis. However this issues should be examined further carefully in qualitative data.

Reason	Number	Percent
Fear of side effects	2898	82.1
Not in the village/away from the family	199	5.6
Sick	127	3.6
Felt unnecessary	115	3.3
No response/no reason	47	1.3
Pregnant during the programme	10	0.3
Others	134	3.8

Table-3

Reasons for given by respondents for not consuming the drugs



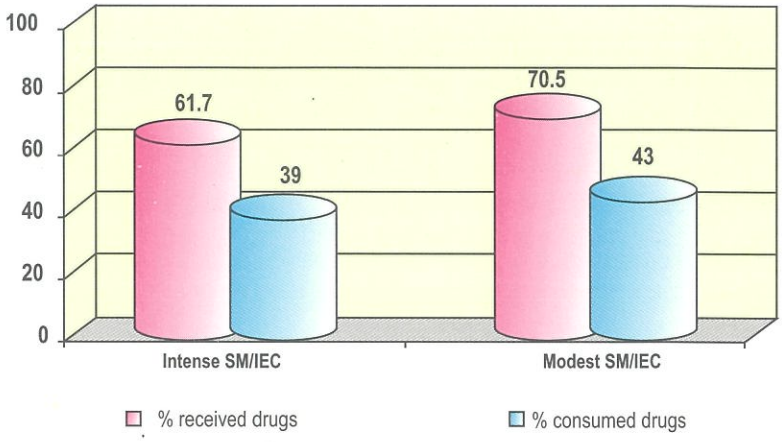


Fig.-3

Impact of community mobilisation (COMBI) on coverage and compliance of MDA

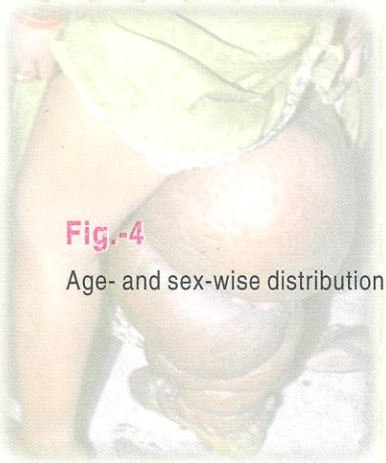
Table-4

Impact of COMBI/MDA on knowledge of people on lymphatic filariasis

KAP Question	% of respondents in Pre-intervention	% of respondents in Post-intervention
Know that elephantiasis spreads from person to person	17.7	18.7
Mosquito bite is the cause of elephantiasis	18.8	27.7
Elephantiasis is preventable	48.7	49.4
Elephantiasis can be eliminated	54.1	54.9
Elephantiasis can be eliminated by taking drugs	46.6	40.0
Mosquito bite is the cause of hydrocele	3.2	3.4
Hydrocele is curable	82.3	82.5
Hydrocele can be eliminated	69.2	70.8

Results of surveys of monitoring side effects:

This survey has been carried out on 483 individuals who have actually consumed the drugs. The survey has been conducted on 5th, 6th and 7th post-intervention days. The age and sex-wise incidence of side effects are shown in Fig.-4. The results indicate that side reactions occurred in 49% of people those swallowed drugs. But only 5.8% reported severe side effects. In this survey, if the effect impaired the individual from work or any other activity such as schooling, labouring, etc., it is considered as severe. Among these reactions, predominant are dizziness (25%), vomiting (12%), head ache (11%), fever (10%), joint/muscle pains (6%), diarrhoea (3.5%), etc. In majority cases, they are mild and persisted for 4-5 days.



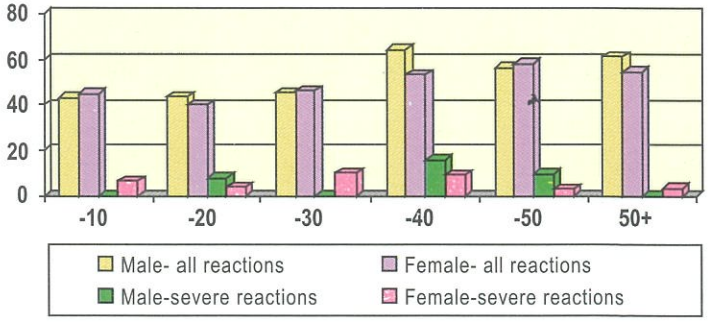


Fig.-4

Age- and sex-wise distribution of side effects

Factors associated with coverage and compliance in MDA:

Based on the results of quantitative surveys and preliminary analyses of qualitative data, some factors have been identified which influenced the coverage and compliance in mass drug administration. These factors are categories as health system/policy related factors, comunity related factors and drug related factors.

Health system/policy related factors:

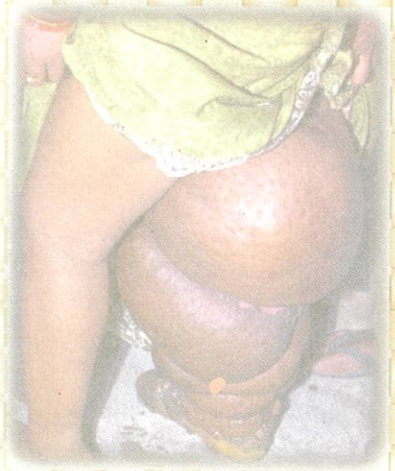
- Planning and co-ordination of the programme
- Involvement and commitment of responsible health system personnel
- Involvement of middle level staff
- Training, particularly the bottom level
- Monitoring of activities of health workers
- Remuneration to health workers/drug distributors
- Involvement of collectors and coordination between various departments
- Separate strategies in urban areas
- Timely processes and supplies
- Strategies to manage adverse side reactions
- Control and monitoring of community mobilisation and IEC activities

Community related factors:

- Comprehensive and timely IEC
- Community participation both in planning the activities at village level and in distribution of drugs
- Urban population's structure and dynamics
- Priority to disease as well as to the programme
- Perception of the community on the programme

Drug related factors:

- Fear of side effects
- Number of tablets



Studies on Malaria

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

Principal Investigator:

Dr. Shobhona Sharma,
Tata Institute of Fundamental Research,
Homi Bhabha Road, Mumbai.

Co-PI:

Dr. B. Ravindran,
RMRC, Bhubaneswar

Dr. S. Ramachandran,
Centre for Biotechnology, Delhi.

Status :

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

Starting date : November 2001;

Closing date : October 2003

Funding agency:

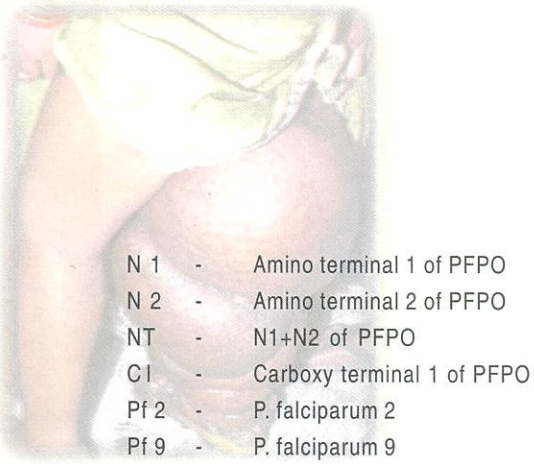
ICMR Task Force on "New Molecules through Genomic Research"

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.

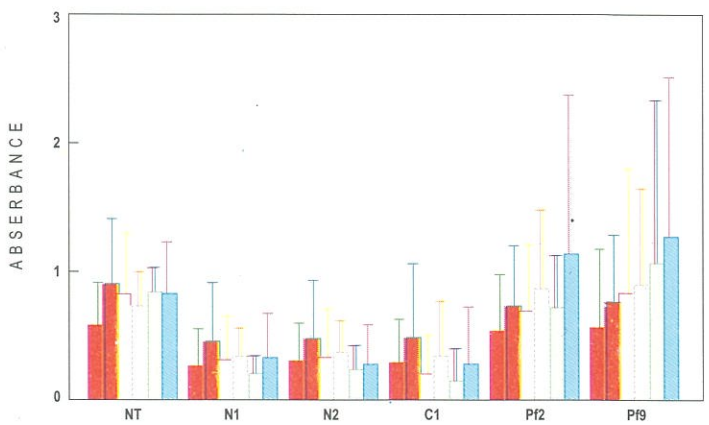
Introduction:

The specific correlates of protective immunity to malaria have not yet been clearly identified. Passive transfer of gamma-globulins from such malaria immune adults into patients has resulted in clearance of parasites in these patients. A differential immunoscreening of an erythrocytic stage specific Cdna expression library of *P.falciparum* was performed in our laboratory, using malaria immune and acute patient sera. This resulted in the identification of several novel Cdna clones, which reacted exclusively and yet extensively with immune sera samples. This was found to be the *P.falciparum* gene homologue of the ribosomal phosphoprotein P0 (PfP0). Further characterization showed that antibodies raised specifically to PfP0 completely inhibited the growth of *P. falciparum in vitro*. Antibodies against other clones, such as Pf9 and Pf2, have also been found to inhibit the growth of *P. falciparum in vitro*. To test whether the IgG raised against PfP0 protein domains has any effect on the parasite growth *in vivo*, passive transfer experiments were performed in mice. Sets of mice, immunized with IgG purified from sera raised in rabbits and mice against the human



N 1	-	Amino terminal 1 of PFPO
N 2	-	Amino terminal 2 of PFPO
NT	-	N1+N2 of PFPO
C1	-	Carboxy terminal 1 of PFPO
Pf 2	-	P. falciparum 2
Pf 9	-	P. falciparum 9

Antibodies to malarial peptides in age stratified population



malarial parasite *P. falciparum* P0 protein domains, were protected against challenge with the lethal 17XL variant of the rodent malarial parasite, P. yoelii. In order to use such antibodies for therapeutics/ prophylactic use, humanized IgG needs to be obtained against protective epitopes. An expression library using mRNA from B-cells of malaria immune persons will provide access to such antibodies. The vector to be used for the synthesis of such a library is pComb3H.

Results:

In order to identify putatively immune subjects with high titres of antibodies, blood samples were collected from two villages of Phulbani district (n=137). Since the objective was to identify immune subjects, 67 of the subjects were re-tested after 12 months. Antibodies to various peptides viz., NT, N1, N2 and C1 representing a large sequence (NT) as well as short sequence of the amino terminal and catboxy terminal sequences (C1) of PfP0 were used for testing. The sera were also tested against (N1 & N2) two other peptides representing regions of Pf9 and pf2 since these antigens were also found to be recognized by antibodies in putatively immune subjects only. The reactivity to the peptides in age-stratified sera are shown in figure below. About 55% of the sera samples were found to contain high titre antibodies to PfP0 peptides in comparison to antibody titres in *P. falciparum* infected patients. Sera of none of the patients currently infected with *P.falciparum* contained significant levels of antibodies to any of the above peptides, confirming one earlier observations that only putatively immune subjects mount an antibody response to these malarial antigens. About 10-12 very high responders have been identified and it is proposed to construct a c-DNA library using m-RNA prepared from B-lymphocytes of these subjects.

1.12 Situation analysis of malaria transmission in Bhubaneswar.

Objectives:

i. To assess the prevalence of malaria: disease and infection in Bhubaneswar city.
ii. To asses the vector population and incrimination of the vector.
iii. To assess the KAP on urban malaria and to asses the health seeking behaviour pattern of urban population.
iv. To make appropriate recommendation for the implementation of CVC programme in Bhubaneswar

Progress:

The epidemiological data on malaria collected from different health facilities of Bhubaneswar for last three years reveal that SPR varied from 10.7% to 18.9% and there is gradual increasing trend (Fig. 1). Pf percentage ranged from 40 to 45%. The demographic data available from Municipal corporation revealed the population of the city is 4,23,465 (1991 census) There are 59 authorised and 131 unauthorised slum areas with a population of 1,90,565, which is about 45% of the total population of the city. The city has been divided into 30 wards and map has been drawn dividing into 5 ecological zones based on type of human settlements.

Investigator:

Dr. N. Mahapatra, Dr. R.K. Hazra, Dr. S.K.Parida, Dr.S.S.S. Mahapatra, Dr.A. Mahapatra, Dr. A.S.Kerketa, Dr.S.K.Kar, Mr.D.P.Hansdah, Mr. N. S. Marai.

Collaborators:

State Health Department, RHFW, BDA, ORSAC, BMC

Status :

Extramural (NAMP Funding)

Starting date : March 2001;
Closing date : March 2004

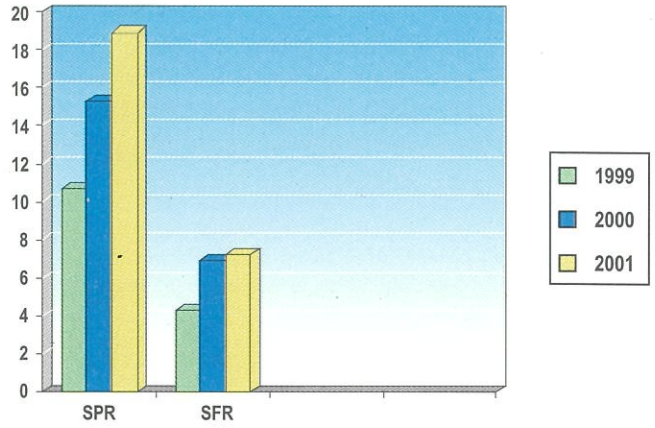


Fig.1.

Malaria situation in Bhubaneswar1999, 2000 & 2001

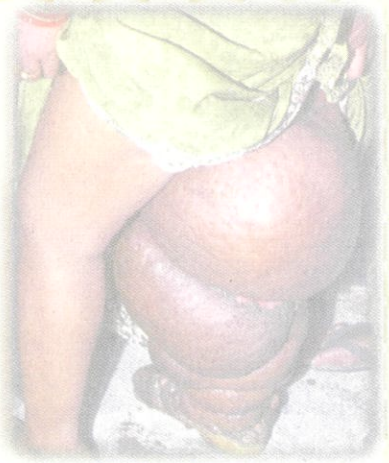
Entomological survey:

The city is divided into 5 zones where each zone has six wards. Entomological survey was initiated from both slum and urban locality of all 5 zones for each season. Both adult and larval collections were done in morning and evening hours. A total of 2897 adult mosquitoes belonging to five genera viz. Aedes, Anopheles, Culex, Mansonioides and Armigeris were collected. Three known vectors,viz, *An.annularis, An. Culicifacies* and *An. Stephensi* were found. The vectors of lymphatic filariasis and dengue were also observed. By dissecting the *Cx.quinquefasciatus* all the larval stages of *W.bancrofti* were detected indicating ongoing transmission of filarial infection. The details of the seasonal density of Anophelines has been depicted in Table 2.

Table-1

Relative abundance of different species of mosquitoes in Bhubaneswar

Species	Per man hour density
Aedes aegypti	1.0
Ae.albopictus	4.0
Ae.vitatus	1.0
An.annularis	3.0
An.culicifacies	0.6
An.hyrcanus	1.3
An.stephensi	5.5
An. Subpictus	3.5
An. Vagus	6.5
Cx. quinquefasciatus	25.0
Cx.gelidus	6.0
Cx. vishnui (group)	5.5
Ma.uniformis	2.0
Armigeris sps.	3.5



Months	*An.stephensi*	*An.subpictus*	*An.vagus*	*An.hyrcanus*	*An.culicifacies*	*An.annularis*
April	0.5	1	2	0.5	-	-
May	1.15	3	0.5	-	-	-
June	-	2	-	0.5	-	-
July	0.6	0.8	2	0.6	0.55	-
August	-	7	2.5	-	1	1.5
September	1	10.5	2	1	1	1
October	1	2.5	-	-	1.5	1
November	4	15	10	2	0	2
December	3	9	9	5	1	4
January	2	8	6	2	1	5
February	2	4	3	.4	1	7
March	1	3	2	1	-	2

Table – 2:

Month wise per man hour density of Anophelines of Bhubaneswar

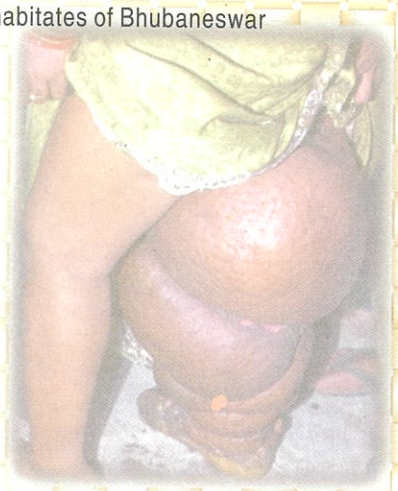
Larval collection:

Details of the larval collection is depicted Table.3 larvae were collected from more than 300 different types of breeding places viz, cesspools, canals, wells, overhead tanks,cemented tanks , waterlogging of the roof for curing of the building, paddy field from in and around Bhubaneswrar and the potential breeding of *An. Culicifacies* was found to be the rice field and riverbed pools for *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 .

Habitat	Number examined	Number positivw for larvae	Number of larvae per dip
River bed pools	150	97	1.5
Canals	2	1	2.8
Wells	5	1	1
Overhead tanks	318	193	1.1
Cemented tanks	62	40	2.9
Cess pool	213	182	3.25
Ornamental fountains	37	13	13.2
Water logging of roof for curing of building	7	2	1.5
Artificial lake	2	2	1.5
Canals with vegetation	1	1	1.4
Seepage water of the canal	1	1	0.4
Tyre	5	2	2.5
Paddy field<30 cm	57	20	1.3
Paddy field>30 cm	43	12	1.8

Table – 3:

Distribution of Anopheline larvae in different breeding habitates of Bhubaneswar



Month wise monitoring of the breeding spot reveals that *An culicifacies* breeding was found to be highest during March in river bed pools whereas *An stephensi* breeding was highest during July in cemented tanks.

Parasitological survey:

Around 537 blood slides were collected from fever cases and examined. The slide positivity rate was ranging from 11.2% to 26.2% in different months during the year (Fig. 2), Pf% was found to be 66.6%, which was much higher than reported earlier.

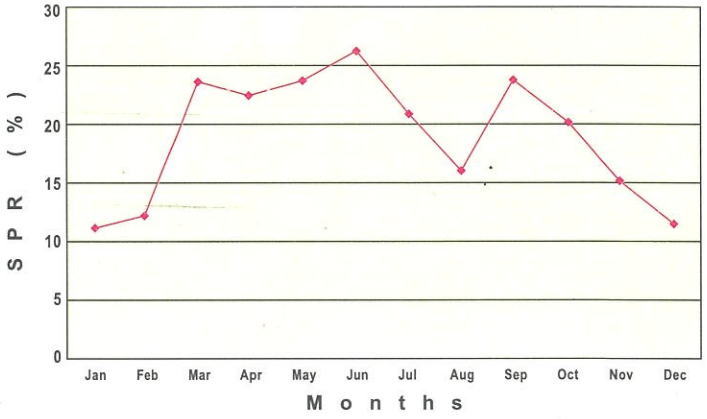


Fig-2

Monthly malaria incidence (SPR) of Bhubaneswar (2001)

1.13 An anthropological perspective of malaria in KBK districts of Orissa

Investigators:

Dr.Amarendra Mohapatra
Dr.R.K.Hazara

Status:

On going

Starting Year : 2002

Closing year : 2005

Out of all states in the country, Orissa recorded the highest case fatality due to malaria. In Orissa the KBK districts share the most. The hilly terrain, tribal pockets, seasonal rivers & water bodies along with forest area and bordering with other endemic states are presumed to be the main contributors towards the malaria situation in the KBK region of Orissa. The socio-cultural aspects including the health seeking behaviour are emerging as the crucial factors in malaria disese control programme in KBK areas. It is well-recognized fact that Malaria exacts a heavy economic and social toll especially tends to strike the most productive age group. Studies shows that malaria imposes heavy burden on working male as well as household female, who provide most of the household care and who also contribute to agricultural work. Poor health status in terms of non-utilisation of modern health care facility in time, inadequate knowledge of proper drug and its availability & use, and

poor socio-economic status and the increasing problem of the infant and under five year old child mortality and all season morbidity among the people inhabiting in KBK region are the main problems of this area. The annual figure of malaria related morbidity and mortality in this region showed an increasing trend during the last decade, i.e. from 22% in 1990 to 33% in 2001. The present study is trying to out line the socio-cultural & ecological reasons of malaria disease in the region with a suggestive Social mobilisation package to be incorporated for the malaria control programme.

Objectives:

1. An **Epidemiological assessment** of malarial situation, by evaluating the Morbidity & Mortality Pattern related to Malaria; and to identify high risk areas in KBK region.
2. To assess the **Health seeking behavior** and **health culture** of the population, with special emphasis to Malaria.
3. **To develop module for social mobilisation including Advocacy** on Malaria in the region to bring better community participation and behavioral changes for achieving malaria control.

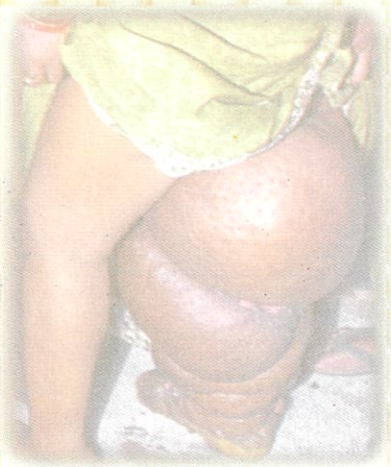
At present four districts namely Nuapada, Kalahandi, Sonepur and Bolangir under KBK districts, were covered. During the visits, interactions with district administration, health authorities, along with the peripheral staff were done. Data pertaining to malaria from the District, PHC & Sub-centre were collected. These data were further analysed to identify high-risk areas and subjected to micro-epidemiological analysis. The number of PHC/CHCs present in each of the selected districts like Bolangir, Kalahandi, and Sonepur & Nuapada were 14, 13, 6 & 5 respectively. For the present study two high risk PHC/CHCs from each were selected for the present study, after analysis of the data. Further from these selected PHC/CHCs high-risk sub-centres were identified, on the basis of Slide Positivity Rate (SPR) and malaria attributed deaths. From these selected Sub-Centres selection of high-risk villages were done. The sampling is carried out following standard multi stage sampling frame procedure.

Table 1:

Details of PHC, Sub centre & villages covered under the study

Districts	PHC	Sub-Centre	Village Surveyed	POP*	Respondent Interviewed (n=265)		Paracheck +ve
					Fever cases	Others**	
NUAPADA	KHARIAR ROAD	Motanuapada	Supuli	450	8	5	6
			Motanuapada	380	6	1	2
		Kodameri	Bairibhadi	550	16	3	7
	BHELLA	Bhella	Bhella	300	8	3	2
			Kuljunpada	480	11	3	4
		Rajna	Malipada	450	9	2	1
			Rajna	320	7	1	1
KALAHANDI	CHILLIGUDA	Dasigaon	Bandalpada	580	12	3	7
			Kendupati	400	9	4	4
	TH. RAMPUR	Karlapat	Karlapat	375	14	3	11
SONEPUR	TARVA	Komsara	Deulipadar	570	20	6	9
		Menda	Khagsakana	620	8	3	2
	NAIKENPALLI	Rengali	Khemundia-munda	350	10	2	2
		Lacchipur	Dapalli	430	12	2	2
BOALNGIR	LOISINGHA	Uperbahal	Upperbahal	320	12	3	3
		Kusanga	Badra	300	6	2	2
	KHAPRAKHOL	Odiyapalli	Bhalludungri	450	11	2	3
		Maharapadar	Chaulabanji	340	8	1	1
			Nandupali	500	11	2	1
	SAINTALA	Bhadra	Bhundimuhan	250	2	1	0
		Samara	Samar	400	10	3	2
TOTAL= 4	TOTAL=9	TOTAL= 16	TOTAL =21	8815	210	55	72

* = Population data of AWW Centre of respective villages;
** = Interview of respondent without fever (includes village head).



MAJOR FINDINGS OF EMPIRICAL FIELD STUDY IN SELECTED PLACES IN KBK REGION:

KBK region constitutes 30.6% of land area with 19.7% of states population. Among them 45.0% are tribals and 19.0% are scheduled caste. KBK region contributes 18.0% of the total malaria deaths of Orissa. The situation reveals a sever malariogenic threat in this region (as per the State Health Statistics).

The field trial on qualitative research followed by a quantitative Knowledge, Attitude, Believe and Practices (KABP) Survey on Malaria in selected villages under KBK region by employing scheduled guide on malaria and structured questionnaire. The interviews of total 265 respondents were interviewed from these four districts, so far. All the respondents were interviewed for different disease ranking and malaria in special have been asked in an holistic fashion with due emphasis, on samples from different sub population such as tribes, caste and elites people and their opinion in a open-ended survey guide procedure.

Summary of the qualitative findings from the study site in KBK region

Developmental aspects	Poor infrastructure: - Kuccha Road (No drainage facility, many water collection points in little rain), Absence of modern amenities like: - Tele phone facility, Recreation hall etc. in most of the villages.
Habitats	The houses are scattered caste & tribe wise. Majority of people are using Jhiker (Roasted mud plate) thatched house in Nuapada & Kalahandi others are using straw. The tribals prefer to stay along with their domestic animal under one roof. {The Zoophilic & Anthropophilic habit of vectors has to be studied}. This is due to fear of jungle animals and lack of more rooms. Where as the, other caste people keep their domestic animals in front of their house (open / temporary shed).
Hygienic aspects	No latrine facility. Open field defecation is the habit of the people. For bathing, people used different source of water commonly used in different seasons, like river, pond, dug-well/ tube-well in the surrounding area etc. No specific drainage facility found in the village. The garbage and used-water disposal is indiscriminate.

Life Style of people	The food pattern consists of consumption of boiled- rice soaked in water (pakhal bhat) along with an onion - chilly and salt in morning and little veg / dal at night. Chicken/ Pork/ Mutton or buffalo meat is used either for festival or on occasions of marriage etc. Ragi gruel & rice gruel is also often used in lean seasons. People preferred to sleep outside in summer season. People are not in habit of using mosquito net. Smog of turmeric/ neem leaf / Sal leaf etc are used to keep away the mosquitoes. Consumption of country liquor (Tadi/Handia/ Salapa-ras) is common in the area, and almost among all the age groups. Besides these, mahuli (a country liquor) is also well familiar and consumed by the working class people and especially the elders, during the time of feeling pain, nausea & fever in their body or for festival period and for entertainment etc.
Health Service utilization	People in these area preferring to wait for some time (i.e. for at-least two to three days) to mature the disease fully in their body and then only they go for treatment. First of all people use home based remedies, then they go for advise of village desari or other traditional practitioner for relieve. Next they go for using cheaply available medicine commonly used by others. And, even if the fever does not reduce, then they consult village head/other elder people or village medicine man than to the quacks, who are readily and easily available in the village. If disease persists long, then they consult doctor for treatment. The treatment seeking behaviour among caste and tribes are varies. It is observed that, the scheduled caste people use free govt. health service than the scheduled tribe population.

The findings reveal that people consider malaria as severe among vector borne diseases, but they are more concerned with the common ailments e.g. back-pain, cough, and weakness which are responsible for morbidity. The ranking of malaria disease according to people's opinion is lower then the above noted common ailments. People who get attacks of fever consume Chloroquine - from the AWW / ANM of their respective village. Radical Treatment is often not carried out. The local untrained medical practitioner – quacks do treat & use anti-malarials indiscriminately, which creates problems later on as reported by health staff. The Gond, Paraja & Kondh tribes are the major population in the area under report. Tribal groups report more malaria than their other cast counterparts. Knowledge about malaria fever and its symptoms are well known to the inhabitants in the area. Villages, which are adjacent to local town, had clearly mentioned that mosquitoes as the vector and responsible for the disease, in comparison to those who are little away from the town area. The differences in medicine consumption by tribal population and other backward people are found to be different as compared to other people in the study area; the study is in progress.

1.14 Population structure of *P.falciparum* in clinical isolates of Orissa

Investigators:

Dr. M.R.Ranjit,
Dr. G.P.Chhotray,
Dr. B.P. Dash,
Mr. A.S. Acharya,
Mr. H. K.Khuntia,
Ms. Anamika Das

Status :

Intramural

Starting Date :

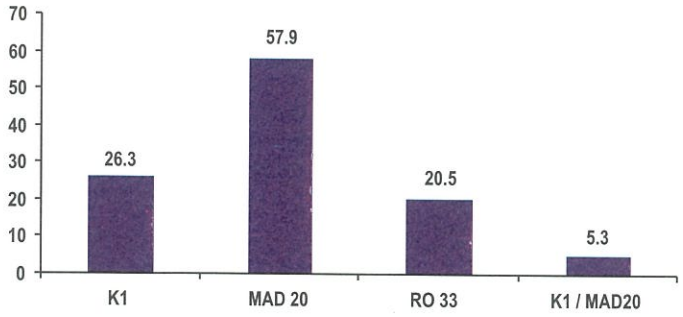
Closing Date :

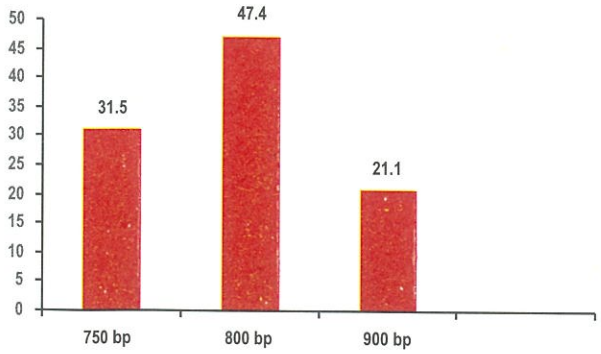
Objectives:

1. To study the extent and / or frequency of genetic diversity in natural population of P.falciparum over space and time
2. To investigate the difference in parasite or carrier sequence type prevalence between asymptomatic and symptomatic malaria

Observations:

A total number of 19 (7 uncomplicated and 1 severe) isolates from clinical cases of P.falciparum malaria collected from Keonjhar, Phulbani and Malkangiri field station operational areas of Orissa and were analysed for allelic variations of GLURP and MSP – 1 genes. Parasite DNA was isolated from 100 ml of infected venous blood by phenol extraction and ethanol precipitation. From the analysis it was observed that there are 3 types allelic variation (750 bp, 800bp and 900bp) of GLURP, of which 800 bp allelic type was more common (47.4%) than the other two (figure 1) and incase of MSP 1 MAD 20 type of allelic variant was found to be present in 57.9% of the cases of the studied samples followed by K1 (26.3%) and RO33 (20.5%). Only 5.3% of the cases were found to have mixed type of alleles (K1 + MAD 20) (figure 2).





Studies on Tribal Health

1.15 Studies on molecular variants of G6PD deficiency with special reference to G6PD Orissa (44 Ala?Gly) among malaria endemic tribal population of Orissa

Investigators:

Dr. M.R.Ranjit, Dr. G.P. Chhotray, Dr. B.P. Dash, Mr. H. K. Khuntia

Status:

Intramural

Starting date : April 2001

Closing date : March 2004

Objective:

i. To study the prevalence of G6PD deficiency among the male tribal population residing in malaria endemic areas

ii. To characterize the G6PD deficiency variants at the molecular level.

iii. To study the clinical profile, morbidity and mortality pattern amongst G6PD deficiency population with special reference to G6PD Orissa.

Observation :

A total no. of 1360 individuals belonging to Kolha (n = 76), Juanga (n = 361), Desia Kandha (n = 107), Kutia Kandha (n=133) and Didayi (n=683) tribes in the operational areas were screened for G6PD deficiency by DCIP decolorisation test. Of the total cases 53 (3.7%) were found to be G6PD deficient (table 1). One ml of venous blood was collected in ACD anticogulant from all the deficient and from an equal number of normal individuals for biochemical and molecular analysis of G6PD variants. The quantitative estimation and kinetic assay of G6PD enzyme revealed that the enzyme activity ranges from 6.9 to 11.3 IU / gHb in normal individuals and 1.10 to 2.09 IU / gHb in deficient individuals. The Km value for NADP was significantly higher ($P < 0.001$) in deficient individuals compared to normal ones (table 2) , while the electrophoretic mobility of both normal and deficient enzymes were identical. The exon III and IV of the Gd gene was amplified by using the appropriate primers

(5'CAGCCACTTCTAACCACACACCT3', & 5'CCGAAGTTGGCCATGCT GGG3') and restriction digestion was done by Hae III. All the deficient samples were found to have lost one restriction site of Hae III indicating the mutation to be of "G6PD Orissa" type

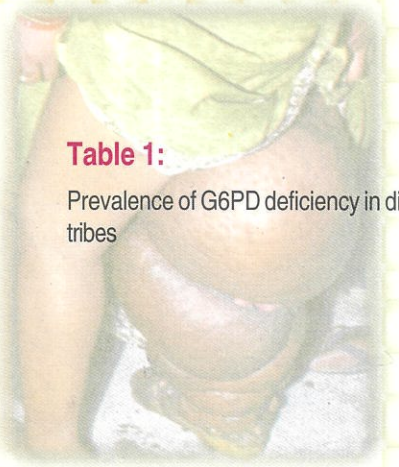


Table 1:

Prevalence of G6PD deficiency in different tribes

Area	Tribe	No.of samples	Deficient No. (%)
Keonjhar	- Kolha - Juanga	76 361	4 (5.2) 28 (7.8)
Kandhamal	- Desia Kandha - Kutia Kandha	107 133	8 (7.5) 5 (3.7)
Malkangiri	- Didayi	683	8 (1.2
	Total	1360	53 (3.4)

Category	Activity Mean (Range)	Km (µM) for NADP Mean ± SD
Deficient	1.72 (1.10 – 2.09)	59 + 5
Normal	9.37 (6.9 – 11.3)	12 + 2

Table 2: G6PD Assay

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

Principal Investigator:
Dr. G.P.Chhotray

Starting date : December 1999;

Date of completion : January 2003

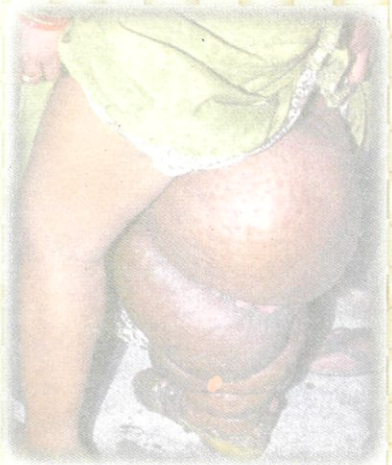
Funding:
ICMR Task Force

Objective:

1. A comprehensive assessment of health status and epidemiological profile of 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.

Observations:

This is a community based comprehensive study in two primitive tribes of Orissa such as Bondo and Didayi tribes which is in III and IV phase of the study. The situation analysis survey pertaining to epidemiological profile has been enumerated in Table 1 and was compared with Orissa state and Malkangiri district figures. While studying the various demographic profile (Table – 2), it is observed that the Bondo and Didayi constitute 0.14% of the total state's tribal population, where female outnumber the male (the sex ratio being 1188 and 1116 per 1000 males in Bondo and Didayi respectively). The decadal growth rate and the literacy rate was observed to be 12.2 / 9.4% and 7.8 / 12.8%



respectively in Bondo and Didayi, which is less compared to national and state scenario. The number of birth, death and infant death was observed to be 42, 41 and 7 respectively amongst the 1954 population studied from Bondo tribe and similarly 47, 40 and 7 among 1697 Didayi tribes studied. The mortality pattern in different age groups in the studied tribe is depicted in table 3.

The comprehensive health status among the 2 tribes was 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) respectively, while 54.3% and 39.9% of adult had anaemia as an important clinical finding. This was followed by fever, acute respiratory disease, malaria and diarrhoeal disorder as depicted in Table 4. Malaria continues to be one of the important health problem in these areas, the detail status is depicted in Table 5. The nutritional status based on anthropometric indices has been shown in Table 6, which reveals 6.5 and 5.9% of the children of the 0 – 14 years age have severe stunting, 28.11 and 19.7% had severe wasting and 21.2 and 18.8% had severe underweight respectively in Bondo and Didayi tribes. The various biochemical tests such as Glucose, Liver and Renal Function Test did not reveal any gross metabolic disorder.

Apart from the intervention by administering appropriate drugs for minor ailments during the time of clinical examination by the Medical Officer and the field unit, the community was oriented to participate in the ongoing health care delivery system in association with health personnel both Medical and Paramedical workers as resource person. Suitable IEC activities were also undertaken during the study.

Table – 1 :

EPIDEMIOLOGICAL PROFILE OF TWO TRIBES (BONDOS & DIDAYI) IN COMPARISION TO STATE AND DISTRICT (2001 CENSUS)

		Orissa	Malkangiri	Bondo	Didayi
1	Geographical Area in Sq. Kms,	155707	6190	130	300
2.	Population	36705920	480232	5895	5763
3	Decadal Growth Rate	15.94	13.7	12.2	9.4
4	Density of Population / Sq. Km	236	69	40.0	19.2
5	Sex Ratio per 1000 male	972	996	1188	1116
6	Percent of ST	22.2	57.7	91.6	76.1
7	Crude Birth Rate	24.1	28.6	18.34	24.3
8	Crude Death Rate	10.6	14.3	19.2	23.7
9	Infant Mortality Rate	97	107.0	139.5	131.6
10	Maternal Mortality Rate	7.4	8.3	12.0	10.9
11	Life Expectancy	54.3	53.8	48.7	57.1

Table – 2 :

DEMOGRAPHIC PROFILES OF BONDO AND DIDAYI TRIBES

Tribe	Origin	Distribution	Area (in sq. Km.)	No. of G.P.	No. of Villages /No. of Sample Villages	No. of H.H./ Sample H.H.	Total Population /Village Population	Sex Ratio Female / 1000 male	Litracy	Decadal Growth Rate
Bondo	Mundari Group of AstroAsiatic	Bondo hill of Malkangiri	130	2	29/9	1458/ 523	5895/ 1954	1188	7.8	12.2
Didayi	Mundari Group of AstroAsiatic	Kondo Kambenu hill of Malkangiri	300	4	37/6	1322/ 388	5763/ 1697	1116	12.8	9.4
India	573 tribes 74 primitive tribes	Half of the world's indegenous people, 67.8 million					102 million	946	75.85	17.94
Orissa	62 tribes 13 primitive tribes	22.4% of the state population					36 million	972	60.44	15.94
Malkangiri	4 primitive tribes	57.6% of the district population					0.48 million	996	28.44	14.88

Table – 3

Vital Statistics

Tribe	No. of Birth / CBR	No. of Death / CDR	No. of Infant Death / IMR
BONDO(N = 1954)	42 / 21.5	41 / 21	7 / 166.7
DIDAYI(N = 1697)	47 / 27.7	40 / 23.6	7 / 148.9

Table – 4

Comprehensive Health Status

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)	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			2 (0.7)	10 (3.5)
	• Leprosy			2 (0.7)	2 (0.7)
	• Yaws			1 (0.35)	
	• Hepatitis			1 (0.35)	
7.	Anaemia	130 (54.8)	159 (63.6)	157 (54.3)	113 (39.9)

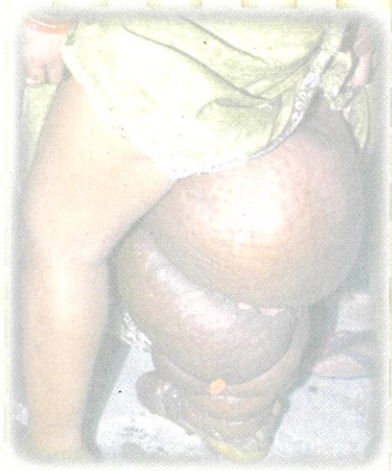


Table – 5 :

Malaria Situation

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

Table – 6

PERCENTAGE OF CHILDREN (0-14 yrs) CLASSIFIED AS UNDERNOURISHED BASED ON ANTHROPOMETRIC INDICES OF NUTRITIONAL STATUS

Tribe	Stunting (Ht / age %)				Wasting (Wt / Height %)				Underweight (Wt / age %)			
	Normal >95	Mild 87.5 - 95	Moderate 80-87.5	Severe 70-80	Normal >90	Mild 80-90	Moderate 70-80	Severe <70	Normal >90	Mild 75-89	Moderate 60-74	Severe <60
Bondo N=217	122 56.2	46 21.2	35 16.13	14 6.5	74 34.1	49 22.6	46 21.2	48 22.1	34 15.7	62 28.6	75 34.6	46 21.2
Didayi N=218	121 55.5	43 19.7	41 18.8	13 5.9	78 35.8	48 22.0	49 22.4	43 19.7	41 18.8	64 29.35	72 33.0	41 18.8
Total N=435	243 55.9	89 20.5	76 17.5	27 6.2	152 34.9	97 22.3	97 22.3	91 21.9	75 17.2	131 30.1	147 33.8	87 20

Stunting

$$= \frac{\text{Ht. of child X 100}}{\text{Ht. of Child at same age}}$$

= Percentile value comparing with NCHS reference population.

Water law's classification :

Wasting

$$= \frac{\text{Wt. of child X 100}}{\text{Wt. of Child at same height}}$$

= Percentile value comparing with NCHS reference population.

Gomez classification :

Weight for age

$$= \frac{\text{Wt. of child X 100}}{\text{Wt. of Normal child of same age group}}$$

= Percentile value comparing with NCHS reference population.

Investigators :

Dr. G.P.Chhotray,
Dr. B. B. Pal

Status :

Extramural
(Ministry of Health & FW, Govt. of India)

Starting date : March 2000;
Closing date : February 2005

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

Objective:

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 diseases 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 an aim of educating and training the medical and paramedical workers at the P.H.C. level in the health care delivery system a future strategy for timely detection and management of these diseases.

This is a community based study involving 4 primitive tribes such as Bondo, Didayi, Juanga and Kutia Kondha in 4 different geographical regions of the state. The phase I study has been completed in Bondo and Didayi tribe. The situation analysis and clinical investigations has been performed in 9 Bondo, 6 Didayi, 3 Kutia Kondha and 2 Juanga villages in order to assess the health status and morbidity pattern. A detailed clinical examination was performed on 1252 individuals belonging to Bondo (526), Didayi (533), Kutia Kondha (121) and Juanga (72) population. The situation analysis revealed (i) **Diarrhoea including Cholera :** There are sporadic outbreak of diarrhoeal disorders including cholera through out the year attending its peak during the rainy season i.e. period July to October (Table 1). Total number of 364 (Bondo : 142, Didayi : 128, Kutia Kondha : 94) rectal swabs, collected from both community and hospitalised cases, were analysed. Of which 218 (Bondo : 86, Didayi : 71 and Kutia Kondha : 61) were found to be culture negative. Of those culture positives 9.6% (n = 14) were *V. cholerae*. 13 isolates were the *V. cholerae* O1 and one strain *V. cholerae O139*. Other enteropathogens isolated were *Shigella* (4.2%) and *Salmonella* (0.7%) and E. coli (83.6%) (Table 2). **Intervention for Cholera :** ORS Citrate solution was instituted for the acute cases in the field according to the dose schedule for the mild to moderate cases, while severe cases were taken to the nearest hospital for further treatment. A maintenance dose of 100 ml / Kg body weight daily was instituted for convalescent cases. Antibiotic (Tetracyclin, 500 mg) 4 times

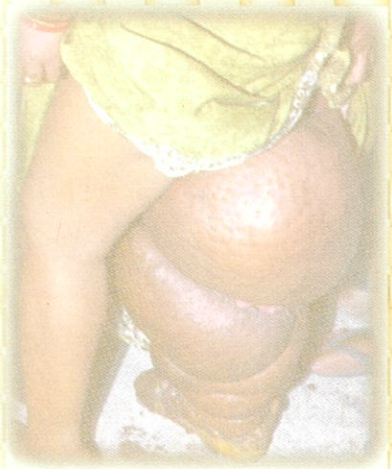
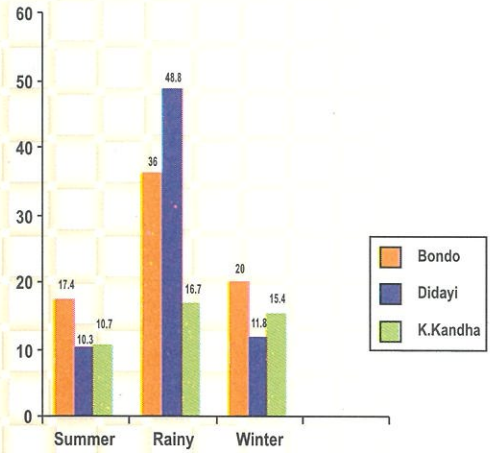


Fig 1 :



a day for three consecutive days for adults and 125 mg / Kg body weight for children were administered depending on the severity of the disease. **(ii) Intestinal Parasitism :** A total 526 stool samples from Bondo and 33 from Didayi were examined microscopically. Hook worm infestation was observed in 11.0% of Bondo and 10.7% in Didayi, while 21.9% and 14.1% cases had Round worm, 1.14% and 2.1% with Trichuris, 4.7% and 7.3% with *E.histolytica*. and 4.7% and 5.1% cases infested with Giardia in Bondo and Didayi community respectively. From the study it was evident that Round worm infestation was the commonest helminthic infection and *E.histolytica*. was the commonest protozoal infection (Table 3). **Intervention for Intestinal Parasites :** After the first round of stool examination, cases found to be positive for helminthic infection, were given single dose of Albendazole (400 mg) above 2 yrs of age and 200 mg less than 2 yrs of age. For protozoal infection Metronidazole (400 mg) twice daily for 5 days to adults and 200 mg twice a day for five days to children was given. Repeat stool examination is being performed after every three months. (iii) **Vit A deficiency :** During the course of clinical examination a high prevalence of Vit A deficiency in the form of night blindness, conjuctival xerosis, Bitot's spot and Keratomalasia was observed. **Intervention :** Childrens and infants having clinical signs of Vit A deficiency were given Abdec drops (5 – 10 drops / day) for 30 days. Adults having signs of Vit A deficiency were given capsule A – Z (1 cap) daily for 30 days as prophylactic dose. (iv) **Scabies :** The clinical examination revealed that 26.4% of Bondo, 7.69% of Didayi, 21.48% of Kutia Kondha and 25% of Juanga tribe

Table 1:

Analysis of rectal swabs collected from patients having complains of gastroentetis, diarrhoa / dysentry

Tribe	MARCH - JUNE SUMMER				JULY-OCTOBER RAINY				NOVEMBER - FEBRUARY WINTER			
	Community		Hospital		Community		Hospital		Community		Hospital	
	No. of Rectal swab collected	Culture positive	No. of Rectal swab collected	Culture positive	No. of Rectal swab collected	Culture Positive	No. of Rectal swab collected	Culture Positive	No. of Rectal swab collected	Culture Positive	No. of Rectal swab collected	Culture Positive
Bondo	46	8	2	2	50	18	24	24	20	4	0	0
Didayi	39	4	2	2	41	20	29	29	17	2	0	0
K.Kandha	28	3	1	1	30	5	22	22	13	2	0	0
Total	113	15	5	5	121	43	75	75	50	8	0	0

were affected with scabies. The overall prevalence of infected scabies was 10.3% and non infected scabies was 7.6% (Table 4). **Intervention :** For the non infected scabies Benzyle Benzoate emulsion (12.5%) was applied below the neck for 3 consecutive days. Personal hygiene was also ensured and treatment was extended to all members of the family along with other symptomatic treatments.

Table 2:

Analysis of stool samples / rectal swabs from the tribal areas.

Test \ Tribes	Bondo	Didayi	K. Kondha	Total
Total samples collected	142	128	94	364
Culture positive	56 (39.4)	57 (44.5)	33 (35.1)	146 (40.1)
V. Cholerae	5 (8.9)	3 (5.3)	6 (18.2)	14 (9.6)
V. Cholerae O1	4 (7.1)	3 (5.2)	6 (18.1)	13 (8.9)
V. Cholerae O139	1 (1.8)	0	0	1 (0.7)
E. Coli	46 (82.1)	50 (87.7)	26 (78.8)	122 (83.6)
Shigella Sp.	4 (7.1)	1 (1.7)	1 (3)	6 (4.1)
Samonella	1 (1.8)	0	0	1 (0.7)
Culture Negative	86 (60.5)	71 (55.4)	61 (64.9)	218 (59.9)

Table 3:

Intestinal Parasitism Amongst Studied Tribes

Tribe	Age group	Total No. of samples	Protozoa %		Helminthes %					Total %
			Eh	Giardia	Round worm	Hook worm	T. trichuria	H. Nana	Strongyloids	
Bondo	0 – 14 Yrs	237	6.7	3.8	26.6	14.8	0.8	0.8	0	53.6
	> 14 Yrs	289	12.1	5.5	18	7.9	1.4	1.03	1.4	47.4
	Total	526	9.7	4.7	21.9	11	1.14	0.95	0.76	50.2
Didayi	0 – 14 Yrs	250	6.4	4.4	15.2	14.4	2	2.8	0	45.2
	> 14 Yrs	283	8.1	5.6	13.1	7.4	2.1	1.4	1.1	38.1
	Total	533	7.3	5.1	14.1	10.7	2.1	2.1	0.6	41.8
Grand Total		1059	8.5	4.9	17.9	10.8	1.6	1.5	0.7	46

Table 4:

Scabies amongst the studied tribes

Tribe	Age Group	Sample Size	Infected	Non Infected	Total Scabies affected
BONDO	0 – 14	237	32 (13.5)	24 (10.1)	56 (23.7)
	> 14	289	58 (20.1)	25 (8.6)	83 (28.7)
	Total	526	90 (17.11)	49 (9.3)	139 (26.4)
DIDAYI	0 – 14	250	16 (6.4)	17 (6.8)	33 (13.2)
	> 14	283	2 (0.7)	6 (2.1)	8 (2.8)
	Total	533	18 (3.38)	23 (4.3)	41 (7.69)
K.KANDHA	0 – 14	56	9 (16.07)	6 (10.7)	15 (26.8)
	> 14	65	4 (6.1)	7 (10.76)	11 (16.92)
	Total	121	13 (10.74)	13 (10.74)	26 (21.48)
JUANGA	0 – 14	42	6 (14.28)	4 (9.5)	10 (23.8)
	> 14	30	2 (6.66)	6 (20.0)	8 (26.67)
	Total	72	8 (11.11)	10 (13.89)	18 (25)
GRAND TOTAL	0 – 14	585	63 (10.7)	51 (8.7)	114 (19.5)
	>14	667	66 (9.9)	44 (6.6)	110 (16.5)
	Total	1252	129 (10.3)	95 (7.6)	224 (17.9)

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

Principal Investigator:
Dr. G.P.Chhotray

Starting date : October 1999;
Date of closing : September 2003

Funding:
Ministry of Health and F.W., Govt. of India
(A multi centric project)

Aims and Objectives:

i. To find out the prevalence and aetiology of Nutritional anaemia.

ii. Clinical evaluation, management and monitoring of detected cases anemia and hemoglobinopathies.

iii. To provide necessary supplementary intervention programme for formulating the future strategy of education and training to the doctors of PHC level.

Table 1:
Age wise distribution of Hemoglobin level among studied tribes

Tribe	Age group	Level of hemoglobin (g / dl)				
		Mild (9 – 11g / dl)	Moderate (7 – 9g / dl)	Severe (< 7g / dl)	Normal (> 11g / dl)	Total anamic patient
BONDO	0 – 14 (n = 237)	106 (44.7)	24 (10.1)	1 (0.4)	106 (44.7)	130 (55.3)
	> 14 (n = 279)	141 (50.5)	16 (6.7)	0	122 (43.7)	157 (56.3)
	Total (n = 516)	247 (47.9)	40 (7.7)	1 (0.2)	228 (44.2)	288 (55.8)
DIDAYI	0 – 14 (n = 218)	117 (53.7)	40 (18.3)	2 (0.9)	59 (27.1)	159 (72.9)
	> 14 (n = 252)	68 (27)	36 (14.3)	9 (3.6)	139 (55.2)	113 (44.8)
	Total (n = 470)	185 (39.4)	76 (16.2)	11 (2.3)	198 (42.1)	272 (57.9)
JUANGA	0 – 14 (n = 38)	8 (21)	2 (5.3)	2 (5.3)	26 (68.4)	12 (31.6)
	> 14 (n = 28)	8 (28.6)	3 (10.7)	0	17 (60.7)	11 (39.3)
	Total (n = 66)	16 (24.2)	5 (7.6)	2 (3)	43 (65.2)	23 (34.8)
TOTAL	0 – 14 (n = 493)	231 (46.8)	66 (13.4)	5 (1)	191 (38.7)	302 (61.3)
	> 14 (n = 559)	217 (38.8)	55 (9.8)	9 (1.6)	278 (49.7)	281 (50.3)
	Total (n = 1052)	448 (42.6)	121 (11.5)	14 (1.3)	469 (44.6)	583 (55.4)

Detailed clinical examination and laboratory investigations has been performed in total 1052 individuals belonging to Bondo (516), Didayi (470) and Juanga (66) tribes. Based on the Haemoglobin level, 44.6% of the total studied population (44.2% Bondo, 42.1% Didayi and 65.2% Juanga) were found to be normal, 1.3% (14 out of 1052) were suffering from severe anaemia and 54% (569 out of 1052) of them from mild to moderate anaemia. From the distribution of different grades of anaemia (Table 1) it is found that the prevalence of anaemia is more among Didayi and Juanga tribes than the Bondo tribes.

From table 2 it is evident that a total no. of 23 (2.0%) are positive for sickle cell trait (HbAS) (Bondo 5, Didayi 14 and K.Kondha 6), 29 (2.6%) for b thalassaemia and 17 (1.5%) for G6PD deficiency.

Table 2:

Status of sickle cell and hemoglobinopathies amongst different tribes studied

Tribes	Sickling Positive			Haemoglobinopathies			Nestroft			G6PD
	AS	SS	Total	β thal Trait	β thal Major	Total	Total +ve	Electrophoresis +ve	False +ve	Deficiency
Bondo (n=516)	3 (0.6)	0	3 (0.6)	2 (0.4)	0	2 (0.4)	10 (1.9)	2 (0.4)	8 (1.53)	0
Didayi (n = 470)	14 (2.63)	0	14 (2.63)	15 (2.81)	0	15 (2.81)	28 (5.25)	15 (2.81)	13 (2.44)	4 (0.75)
Kondha (n = 51)	6 (11.7)	0	6 (11.7)	11 (21.6)	0	11 (21.6)	14 (27.4)	11 (21.6)	3 (5.6)	6 (11.7)
Juanga (n = 66)	0	0	0	1 (1.39)	0	1 (1.39)	3 (4.17)	1 (1.39)	2 (2.80)	7 (9.72)
Total (n=1103)	23 (2.0)	0	23 (2.0)	29 (2.6)	0	29 (2.6)	55 (5.0)	29 (2.6)	26 (2.4)	17 (1.5)

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

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.

Investigators :

Dr.R.S.Balgir, Dr.A.S.Kerketta, Mr. B.Murmu, Miss Kalyani Rath

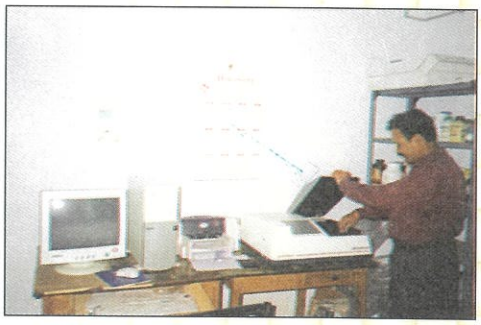
Status:

Extra-mural (Ministry of Health & Family Welfare, Govt. of India)

Starting date : February 2000;
Closing date : January 2005

Background of study

The sickle cell disease, thalassemia and G-6-PD deficiency are highly prevalent among the tribal populations of India which 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 and there is no cure for them, therefore, their prevention in the vulnerable people is highly essential.



Spectrophotometric analysis for hoemoglobinopathies

Progress:

Permission from the state Govt. was obtained along with ethical clearance at institutional level to conduct the study. District administration, health authorities and other functioneries of Sundargarh district were sensitised to get cooperation for smooth running of project by holding several interactive meetings at district level, block level, and village and community level highlighting the importance of study and bringing awareness about the prevalent genetic disorders.

To keep the quality control of the techniques followed in the laboratory for hemoglobinopathies, a few coded samples were sent for analysis in standard laboratory (Dept. of Genetics, SGPIMS, Lucknow), and were found conforming to our results.

Last year, the field work for this project was initiated in Bargaon Block of Sundargarh district after holding the interactive meetings with the villagers. They belonged to Dudh Kharia community. A house-to-house Census was taken and all the households in the village, Dungdungpada and Cheemapada 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.

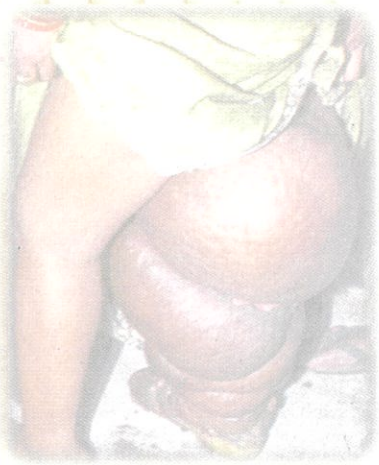
Community sensitization for hereditary hoemolytic disorder

This year also a door-to-door census was taken after holding interactive meetings with the Delki Kharia community at villages, Sarbahal, Dhotipada and Chandnimal in Balisankara Block of Sundargarh district. Clinical examination of subjects was done, medicines were distributed to the ailing persons and blood samples were drawn for laboratory investigations.

Out of about 1000 target coverage of Kharia tribe, 749 persons were screened for sickle cell disease, thalassemia, other hemoglobinopathies, G-6-PD deficiency, and ABO and Rhesus blood groups. Laboratory analysis of 749 blood samples collected from the field was carried out for estimation of total hemoglobin level, Hb A_2, fetal hemoglobin and Hb S, hemoglobin electrophoresis, sickling test, G-6-PD enzyme deficiency (DCIP method), etc.

Clinical as well as laboratory screening for hemoglobino-pathy, thalassemia, G-6-PD deficiency and Rhesus blood groups of Kharia community was carried out following standard techniques and procedures.

The study showed that hemoglobinopathies (13.3%) and G-6-PD deficiency (24.6%) were major public health problems in Kharia tribe of Sundargarh district in Orissa (Fig. 1). Both beta-thalassemia trait (6.3%) and sickle cell disorders (5.6%) were common in the community. For the first time, hemoglobin E has been 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 is very low (1.4%) among the Kharia 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 findings of present study are consistent for ABO and Rhesus blood groups in tribal populations of Central India (Fig. 2).



The above mentioned 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-malarials should be administered taking adequate precautions. Therefore, intervention is highly important for the prevention of these hereditary conditions in the tribal communities.

Further screening along with sensitisation, motivation for carrier detection and bringing awareness in Kharia and Bhuyan tribes are in progress.

1.20 Operational evaluation of stability of Iodine in DFS - A Multi-centric study.

Co-investigators :

Dr.S.S.S.Mohapatra,
Dr.S.K.Das, NNMB,
Dr.G.Bulliyya,
Dr.A.Mohapatra,

Status:

Extramural [N.I.N., Hyderabad
Funded (Multi-centric)]

Starting date : October 2001;
Closing date : September 2002.

Objectives:

1. To prepare DFS and IS using both Refined Common Salts (RCS) and Common Salts (CS) on a large scale basis in a factory.
2. 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 centre in India.
3. To analyse the results of Iodine stability after 6 months as an interim step and at the end of one year for final analysis.

The project started with the receipt of the salt samples 159 bags from different colony each containing RCS-DFS and CS-DFS, RCS-IS and CS-IS in a double blind fashion. The bags are stored at three different places as per the instructions namely: Inside room, Verandah, and Open Air. The sampling was done from each bag upon arrival as per the protocol and duplicate samples are sent to NIN Hyderabad. The samples are titrated as per the protocol in the laboratory in duplicate and the iodine level in ppm is recorded. The similar procedures are followed for sampling on 3rd , 6th, 9th and 12th month. The results of the initial, 3rd months, 6th months , 9th month and 12th month sampling are tabulated and sent to NIN. The samples need to be recoded at NIN, Hyderabad for the exact category of salt The final analysis could be done after completing the final sampling.

A typical marasmic child from Bhelgarh, Phulbani, Orissa

Investigators :

Dr. S.K.Kar,
Dr. S.S.S.Mohapatra,
Dr. S.K.Das, NNMB
Dr. G.Bulliyya,
Dr. A. Mohapatra.

Status :

Extramural - NIN (Multi-centric).

Starting date : January 2002;
Closing date : February 2003.

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

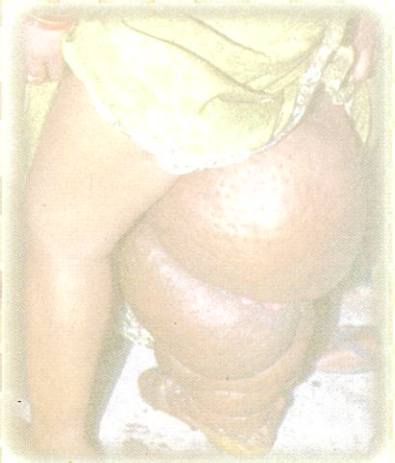
Objectives:

1. To assess the prevalence of clinical forms of IDD among 6-12 years children in selected districts of the states in the eastern region of the country.
2. To assess urinary iodine excretion levels in a sub-samples of 6-12 year children covered for clinical examination.
3. To assess the use of iodized salt by community.

This is a multi-centric study aimed to assess the prevalence of IDD in various regions of India.. The current study is being undertaken by RMRC to assess prevalence of IDD in eastern region of the country in 5 states namely Orissa, West Bengal, Bihar, Jharkhand and Sikkim using 30 cluster sampling method. So far the survey was completed in five different districts as follows. The salt samples were tested for iodine level in the field by rapid spot test method and a sub-sample of the same were analyzed by titration method. Urine samples were analyzed for median urinary iodine excretion levels in the population by Wet digestion method.

Table 1 :

STATE	DISTRICT	TGR (%)	Median urinary iodine excreted (µg/ l)
Orissa	Sundergarh Cuttack	39.6 22.2	95.0
Sikkim	Gangtok	26.6	105
West Bengal	Darjeeling New Jalpaigudi	23.8	- 135
Bihar	West Champaran	39.8	45
Jharkhand	Palamu	21.0	-



1.22 Study on the Nutritional status of Dongria Kondh Primitive tribal and Domb Scheduled Caste populations in Rayagada District of Orissa.

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

Status:
Intramural

Starting date : July 2002;
Closing date : June 2005

Objectives:

1. To assess the health and nutritional status of the socially isolated Dongria Kondh primitive tribe and Domb scheduled caste population groups.

This include study of demography, socioeconomy, socio-cultural practices, morbidity pattern, nutritional status by anthropometry, diet survey, clinical examination and haematology in all age groups and sexes, seasonal variation of household food security, availability and utilization of health care services and nutritional programmes, to provide nutrition education and, suggest suitable intervention programme for improving their nutritional status. A total of 56 villages are selected using probability proportionate to size (PPS) sampling and all the households and individuals of Dongria Kondh ST and Domb SC in each selected villages are included for study.

This study was initiated recently in the month of July, 2002 at Niamgiri hill areas of Rayagada district. Field surveys have been carried out in Bissam Cuttack and Kalyansighpur blocks under the micro-projects of Dongria Kondh Development Agency (DKDA). The two study populations namely Dongria Kondhs primitive tribe and their neighbouring Domb Scheduled caste groups were evaluated from five villages. Total population on Dongria tribe and Domb SC population groups were enumerated. Data on demography, socioeconomy collected from 82 households by door-to-door surveys. Simultaneously, salt samples from 158 households were tested for iodine levels using spot-kit test. Finger prick blood samples collected from 40 subjects for haemoglobin and smear slide samples for malaria and anaemia investigations.

2. SURVEILLANCE

Investigators:

Dr. G.P. Chhotray,
Dr. B.B. Pal,
Mr. H. K. Khuntia,
Mr. C.R. Samantara

Objective:

To find out the prevalence of HIV infection in different risk groups in Orissa

Status : Extramural

Starting date : 1999

Closing date : 2002

2.1 Sero – surveillance of HIV infection in Orissa

Objective :

1. To find out the prevalence of HIV infection in different risk groups in Orissa.

The sero – surveillance for HIV infection has been carried out by this centre since 1987. This year 182 serum samples referred from State AIDS Cell from different risk groups and sources like drug addicts, STD patients, have been screened for HIV infection who were mostly Indians and 4 were foreigners. Out of 182 samples tested , 9 were repeatedly ELISA and WB positive harbouring HIV – 1 virus only (Table 2). Among 9 HIV positive patients 6 were males (Drug abusers – 2, TB patients – 1, heterosexual promiscaows – 1, others – 2), 2 were females and one was a 3 ½ year male child.

Table 2:

Sero positivity for HIV infection

Category	Total sera.	No. +ve ELISA & WB (%)
Drug addicts	13	1 (7.7)
STD patients	102	0 (0.0)
Referred cases (SAC, Bhubaneswar)	36 (4 – Foreigners)	7 (19.4) 0 (0.0)
Others	31	1 (3.2)
Total	182	9 (4.9)

2.2 Surveillance of *Vibrio cholerae* associated with epidemic and endemic cholera in Orissa by Bacteriological and molecular analysis.

Investigators:

Dr. B.B. Pal,
Dr. G.P. Chhotray,
Mr. H.K. Khuntia,
Mr. C.R. Samantara

Status : Intramural

Starting Date : 2001

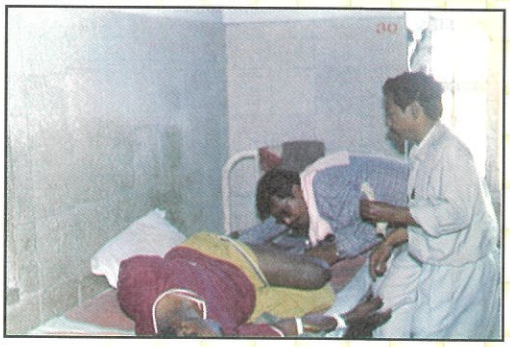
Closing Date : 2003

Objectives:

i. To isolate different strains of *V.cholerae* from hospitalized diarrhoea cases from Puri district and outbreak areas and to analyse serotyping by serology, molecular analysis and anti biogram for each strain.

ii. Subsequent identification, serotyping, antibiogram and molecular analysis of V. cholerae isolates correlating with epidemiological indices.

A total of 210 rectal swabs / stool samples were collected from Puri, Cuttuck, Kendrapada, Jagatsinghpur, Jajpur, Bhadrak, Balasore and Bauda areas of Orissa, which were affected by flood during July & August 2001 and were brought to the R.M.R.C. laboratory in Cary Blair transport media and were bacteriologically analysed. Out of 210 stool / rectal swabs collected 140 (66.7%) were culture positive for various enteropathogens. Of which *E.coli* is the predominant enteropathogen isolated from 74 (52.9%) patients followed by *V.cholerae* 58 (41.4%) and *Sheigella spp.* 8 (5.7%) and 70 (33.3%) were culture negative. (Table – 1)

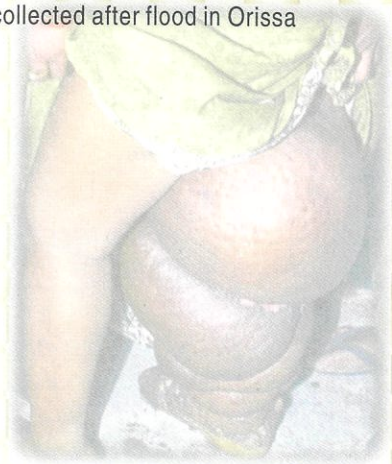


Rectal swab collection from Paradip Port Hospital

Table 1:

Bacteriological analysis of stool / rectal swabs collected after flood in Orissa

Total samples collected	**210**
Culture positive	**140 (66.7%)**
E .coli	74 (52.9%)
V. cholerae	58 (41.4%)
V .cholerae O1	55 (39.3%)
V .cholerae O139	3 (2.1%)
Shigella species	8 (5.7%)
Culture Negative	70 (33.3%)



3. OTHER SCIENTIFIC REPORTS

3.1 Prevalence of Rotavirus infection in children admitted to hospitals of Orissa

Rotavirus are one of the most important aetiological agents of severe diarrhoeal illness of infants and young children worldwide. The present study was envisaged to document the prevalence of rotavirus among hospitalized diarrhoea children between July to November, 2001 in and around Bhubaneswar city. Fresh stool samples were collected from patients (paediatric age group) admitted to Capital hospital / Municipality hospital, Bhubaneswar and SCB Medical college & hospital and SBVP Post Graduate Institute of paediatrics, Cuttack. The ds genome RNA was isolated following the phenol – chloroform extraction procedure, ran through electrophoresis in poly acrylamide gel – stained with silver nitrate.

Out of 200 stool samples analysed so far, 66 (33%) were positive for group A rotavirus infection. The group A rotaviruses of long e-type as well as short e – type were largely detected from infants and young children aged below 2 years. Further, it was found that the highest percentage of rotavirus infection was in the month of August (48.5%) followed by November (47%), July (28%) and October (27%) respectively.

This study shows the importance of rotavirus infection among children suffering from diarrhoea in Orissa. It is necessary to study the rotavirus infection in other parts of state to know the prevalence and seasonal variation for a longer period of time.

3.2 Prevalence of Toxoplasma amongst pregnant mothers

A total of 96 women attending the Gyn & Obst. OPD of various Govt. and Pvt. Hospitals of Bhubaneswar city was randomly selected to detect the seroprevalence of acute toxoplasmosis. Of the total 96 cases 2 belong to Scheduled Caste, 2 Scheduled Tribe and rest belong to General Castes such as Brahmin, Khandayat, Karan etc.

The IgM titre in the serum samples of all these cases were measured by ELISA using the kit of Omega diagnostics, India. The titres of each sample was compared with

the titre of the positive controls supplied along with the kit. The sample was declared positive if the titre is above the cut off OD (>1.1), in the equivocal zone if the OD was between 0.9 to 1.0 and negative if the OD was m below 0.9.

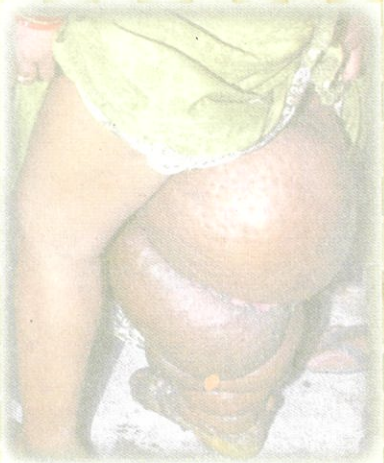
Based on the IgM titre, total 9 (9.4%) cases were found to be positive for toxoplasmosis. Of the 9 positive cases 2 (18.2%) were among the patient having history of single abortion, 3 (60.0%) among repeated/threatened abortions and 4 (5.0%) among the individuals conceived for the 1st time and in the first trimester period. While analysis the distribution of toxoplasmosis among the various caste groups all the cases found positive belong to the higher castes only.

3.3 Activities of NNMB Unit, Orissa, Bhubaneswar

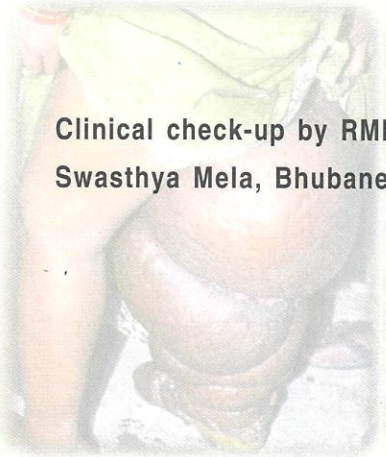
The unit of NNMB under NIN, Hyderabad functioning under RMRC, Bhubaneswar has undertaken Diet and Nutritional Surveys from sampled population of various age groups in sampled districts of Orissa. The survey included assessment of Diet & Nutrient intake, Nutritional status (clinical, anthropometry, and morbidity assessment) demography and socio-economic status of families. In total 1600 families were studied during the year 2000-2001. Besides, Micronutrient survey work was initiated after imparting training to NNMB staff at NIN, Hyderabad from November 2001. Till date three districts and 4477 households and 2417 population were covered. The status was evaluated in vulnerable population using appropriate sampling technique among pregnant mothers, lactating mothers, 1-4 yrs. Children, 6-11 yrs. children, 12-14 yrs. girls and 15-17 yrs. girls. The assessment includes Vit-A, iron, and iodine deficiency status using clinical assessment. Haemoglobin estimation was carried out by cyanomethaemoglobin method using filter paper technique. The work is in progress and data sent to NIN, Hyderabad regularly for compilation and analysis.

Staff of Unit:

Dr. S. K. Das,
Mrs. S. Paikray,
Mr. D. K.Mohanty,
Mrs. Haraprava Sahu,



Opening of "Sickle Cell" stall in Swathya Mela at Bhubaneswar



Clinical check-up by RMRC team in Swasthya Mela, Bhubaneswar

4. SERVICES

4.1 OPD Services on Filariais:

Clinical Division of RMRC provided OPD care and treatment for filariasis twice a week in the filaria OPD at Capital Hospital, Bhubaneswar. So far 904 cases have been clinically examined and treated. A total of 463 number of blood samples were collected and investigated (by OG_4C_3 and ICT) to know the circulatory filaria antigen (CFA) status of the patients. Filarial lymphoedema case are being treated with oral antibiotic, and intermittent compressive therapy and advised to maintain hygiene of limbs. The cases are being followed up in OPD for any reversibility of oedema and to assess any reduction in ADL frequency. Out of 904 cases examined 100(11.1%) were manifesting acute filerial symptoms and 665(73.6%) with chronic signs and symptoms. A total of 376 cases turned out for follow-up re-examination. The data generated before and after the treatment are being analysed.

The Details of the OPD cases are as follows*:

Clinical diagnosis of cases	NUMBER(%)
Lymphoedema Grade -I	363 (40.2)
Lymphoedema Grade -II	169 (18.7)
Lymphoedema Grade -III (Elephantiasis)	61 (6.7)
Lymphoedema + Secondary Infection	39 (4.3)
ADL(Adenolymphangitis)	56 (6.2)
Hydrocele	25 (2.8)
Orchitis	10 (1.1)
LNG(Lymphangitis)+LND(Lymphadenitis)	33 (3.6)
Chyluria	3 (0.3)
Nodule	8 (0.9)
Other** ailments	137 (15.2%)
Total	904 (100)

*** (Period from 07.06.2001 to 30.05.2002)**
**** (Backache, Arthritis, Traumatic arthritis, Plantarfascitis, Vertigo, Neuralgia, Myalgia, URTI, Cellulitis).**

Service given in filaria O.P.D. at Capital hospital, Bhubaneswar :

Dr. S.S.S. Mohapatra,
Dr. A.S. Kerketta,
Mr. T. Moharana,
Mr. R. N. Nayak,
Mr. R.K.Das

4.2 Diagnostic Services on Haemoglobinopathy disorder

Referral services rendered for hereditary hemolytic disorders

This centre is providing diagnosis to the referred cases from different PHCs, peripheral hospitals, medical colleges of the state government. During the period from April 2000 to March 2001, a total of 152 suspected cases were referred for special investigations pertaining to various hematological disorders. Of the total cases investigated, 34.2% were found to be electrophoretically normal, whereas 16.4% of the cases had sickle cell disorder and 27.2% thalassemia. Amongst the sickle cell disorders, the commonest was the sickle cell trait (28.3%), followed by sickle cell disease (9.9%) and sickle cell-beta-thalassemia (0.6%). Beta-thalassemia trait was the most common amongst the thalassemia cases (21.7%), followed by beta-thalassemia major (3.3%) and E-beta-thalassemia (2.0%).

A team of scientists of this centre had also provided the services in the field by screening 366 subjects belonging to village Kaliapada in Gania Block (Nayagarh district) and villages Lumurujena and Usmalika in Boudh Block (Boudh district) of Orissa. The subjects belonged to Chasa, Gauda, Gudia, Keota, Barik, Pana, Dumal, Kumbhar, Kondh, Khaira, Paikkhaira and Sudha. Eighteen subjects (11 Pana and 7 Dumal) showed sickling positive (4.9%) and only 6 subjects (1.6%) showed Rhesus negative blood group. The ABO blood group distribution was as following: A (25.1%), B (28.7%), AB (3.3%) and O (42.9%).

In another series a total no. of 70 cases (43 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 70 cases, 59 belong to general category, 7 to scheduled caste and 4 to scheduled tribe. A detailed clinical examination

The services were rendered by following staff:

Dr. R. S. Balgir,
Dr. G.P. Chhotray,
Dr. M. R. Ranjit,
Dr. B.P.Dash,
Mr. B. Murmu,
Mr. B. N. Sethi

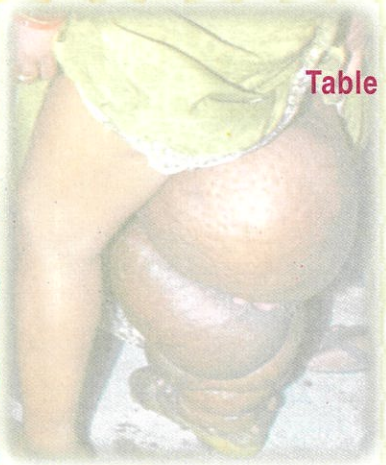


Table 1.

Category	Total	AA	AS	SS	Sb	β thal major	β thal trait
General	59	24 (40.7)	14 (23.7)	4 (6.8)	2 (3.4)	2 (3.4)	13 (22.0)
SC	7	3 (42.8)	1 (14.3)		0	1 (14.3)	2 (28.0)
ST	4	2 (50)	1 (25)	1 (25)	0	0	0
Total	70	29 (41.4)	16 (22.8)	5 (7.2)	2 (2.8)	3 (4.3)	15 (21.5)

and laboratory investigation such as haematological profile by automated cell counter (MS9), quantitative analysis of Hb, HbA_2, HbF and its electrophoresis was carried out by established methods. Out of total 70 cases 41.4% (n = 29) were found to be electrophoretically normal (HbAA), 22.8% (n = 16) sickle trait (HbAS), 7.2% (n = 5) sickle disease (HbSS), 2.8% (n = 2) sickle - β thal (HbS – β thal), 4.3% (n = 3) β thalassaemia major (β thal major) and 21.5% (n = 15) β thalassaemia trait (β thal trait). Further DNA extraction and molecular analysis will be carried out in diseased cases. Results are shown in table below:

4.3 Evaluation of filarial antibody spot assay

Two students of Prof. P.Kaliraj, Centre for Biotechnology of Anna University, Chennai worked in Immunology Division from 7th – 8th January 2002 for evaluation of filarial antibody test kit. The following are the results of the evaluation performed on a double-blind protocol and the results were decoded after completion of the laboratory testing.

Comments:

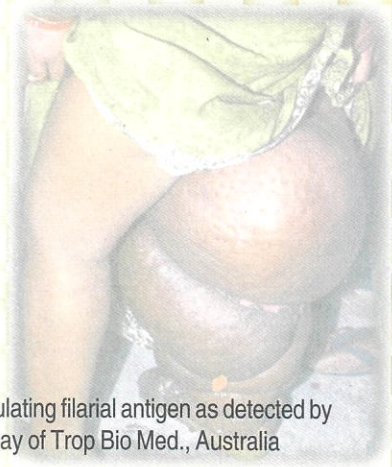
1. The test has a 78.57% sensitivity for detecting Mf +ve cases and sensitivity of 62.5% to detect cryptic infections.
2. However the test has a specificity of only about 62.66% - the test is positive in 33.7% of Endemic Normals and 37.7% of chronic cases who are free of CFA.

The kit needs to be refined in the light of above findings if it is to be used for immunodiagnosis. Increasing the sensitivity may however decrease the specificity.

Table - 1.

Results of evaluation of Filarial Antibody spot test

Sl. No.	Category	Total sample tested	Positive for Filarial Antibody spot assay
1.	Asymptomatic Mf carriers (Mf+ve, CFA+ve)	28	22 Sensitivity - 78.57%
2.	Cryptic Infection (Mf-ve, CFA+ve)	32	20 Sensitivity - 62.5%
3.	Endemic Normals (Mf-ve, CFA-ve)	71	24 Specificity - 66.2%
4.	Chronic Pathology (Hydrocele) (Mf-ve, CFA+ve)	34	19 Sensitivity - 55.88%
5.	Chronic Pathology (Hydrocele & Lymphedema) (Mf-ve, CFA-ve)	61	23 Specificity - 62.3%



CFA = Circulating filarial antigen as detected by Og4C3 assay of Trop Bio Med., Australia

4.4 Clinical Survey of Malaria

PI:
Dr. S.S.S. Mohapatra

Report on Narsinghpur Malaria Survey

The area under report is located in the district of Cuttack, under Block/ PHC, Kanpur. The team of Scientists of RMRC, Bhubaneswar visited the 3 villages namely Nuabalijhari, Kanharpur and Uppar Kanta.

The investigation and survey was carried out in Narsingpur Block following a malarial outbreak report. The present investigation was carried out in collaboration with the concerned Block Chairman.

Table-1:
Epidemiological data of Kanpur PHC

Year	Population	BSE	+ve	Pf	Pf%	SPR	API	ABER	DEATH
1997	139733	8621	674	595	88.28	7.5	9.8	6.2	Nil
1998	142528	8220	485	450	92.78	5.9	3.4	5.8	Nil
1999	145379	7604	310	294	94.84	4.1	2.1	5.2	Nil
2000	148287	10894	642	403	62.77	5.9	4.3	7.3	Nil
2001	150645	9213	775	638	82.32	8.4	5.1	6.1	Nil

A rapid fever survey was done in all the 3 villages. Clinical examination of all patients and spleen survey of children below 9 years was carried out. The result is depicted in Tab:-2, Nine children had splenomegaly of different grades.

During the survey an on-the-spot diagnosis of P.falciparum malaria was done using the Para-Check malaria test kits. In addition to this, regular blood slide collection was done from the reported fever cases. The results are given in Tab:2.

Table-2.

n=89	Spleen No.
Para check +ve for pf. = 19	Grade-I -2
BS+ve = 25	Grade-III-1
	Grade-II -6

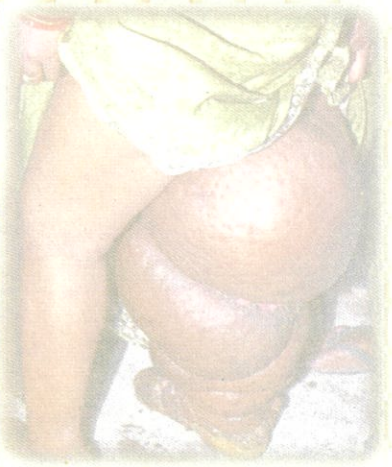


Table-3.

Para +ve	BS -ve	= 9
Para –ve	BS +ve	= 15
Para +ve	BS +ve	= 10
Para –ve	BS -ve	= 55

Summary:

This forest area under report has a mild endemicity, SPR ranging below 10 over the years, as per the PHC data in Tab-1. However, from 3 villages 89 fever cases were reported on the day of survey. These villages are reported to be highly endemic as per the local authorities. Out of 89 cases examined clinically 9 cases were graded for Spleenomagaly. Out of 89 cases 25 were positive for malaria in Blood slide examination. In para check for pf 19 were positive, on the spot. Thus a total positivity was 34 out of 89 BS collected, showing a SPR of 38.2 %, which is very high. But the data of the PHC shows a SPR varying from 4 to 8%.This is obviously because of the low ABER, being below 10%.

4.5 Vector Surveillance in Malaria

Orissa is known to be endemic for malaria. State Health Department undertakes control programme on malaria in all districts, intensified in 152 EMCP blocks known to be highly endemic. Geographically, the State is divided into 4 geophysiographical zones viz. Northern plataue, central table land, eastern ghat and coastal belt. Although, effort has been made to control malaria in the state through drug distribution at community level but no systematic information available on its vector abundance and its infectivity, that can help guiding appropriate control strategy for vector control. In previous year the entomology team of our centre had surveyed the sampled household in four geophysiographical zones for vector abundance infectivity. This year with request from the State Health Department, the centre propose to undertake seasonal surveillance of vector for malaria in sampled households representing each geophysiographical zones for which separate project has been proposed. However, due to occurrence of flood last year in Orissa on request of State Health Department, Entomology team had surveyed the vectors with reference to malaria in flood affected districts and data are also now being collected for all four geophysiographical zones. The results of the survey are given.

This year during mid of July around twenty-two districts out of 30 districts of the state were badly affected by flood. The most affected districts were Cuttack, Puri, Jajpur, Kendrapada, and Jagatsingpur. For more than a week Jajpur and Kendrapada districts were cut off as the floodwater entered into the town. Entomological team visited Kendrapada, Jagatsingpur and Jajpur district soon after the flood to assess the malaria situation in these areas.

Jagatsinghpur district

Though 17 Pf cases were detected out of 1704 (SPR 0.9%) in the year 2000, no malaria positive case was detected out of 341 slides examined during Jan to June of 2001.

Entomological survey:

Adult mosquito collection revealed the presence of malaria (*An. annularis*) and JE (*Culex. vishnui*)vector along with four anophelines and three culicines.

Jajpur district

There was a sharp rise of malaria cases in the month of June (3.5 times) compared to preceeding months. The SPR were 8.4, 10.0 and 37.2% for April, May and June respectively. Jajpur town hospital was contributing more malaria cases as evident from SPR rate which were 50.4, 51.3 and 37.2% in April, May and June respectively. These data showed an alarming situation for epidemic of malaria in Jajpur town. Therefore, entomological team visited three times to Jajpur town. Seven species of mosquitoes were collected. The vector *An. annularis* was found in low density (1.0 PMHD). Three other Anophelines viz *An barbirostris, An subpictus* and *An vagus* were collected, no vector was available, as there was heavy rain during the survey.

Sixty blood slides were collected from Jajpur Municipality area during our visit in the month of August. Out of which 15 slides were positive for malaria (SPR 25%), all the positive slides were *P.falciparum* .

Kendrapara district

The malaria incidence in the district is not so high because the average SPR rate was1.9% from January to June .In Aul PHC the fever case increased after the flood and the malaria incidence went up in the month of July that showed 13 fold increase of the SPR rate in first week (SPR 2.1%) as compared to last week of July (SPR 26%).

Out of 10 species of mosquito collected, two known malaria vectors viz. *An. annularis* and *An. culicifacies* were found with PMHD of 1.3 which was well below the critical density (PMHD 3.3). Towards end of July the flood water had not receded, almost two to three feet water label was seen around most of the villages covering all the paddy fields. This condition was more conducive for breeding of the known vector *An culicifacies* and *An annularis*.

Vector distribution in flood affected districts of Orissa:

Species	Jagatsingpur	Jajpur	Kendrapara	Keonjhar
An.acconi	0.66			
An.annula	1.33	0.8	1.3	1.06
An.barbiro		1.25		0.4
An.culicifacis			1.3	4.4
An.fluviatils				0.6
An.hyrcan	0.66	1.3		0.3
An.subpic		1.09		4.6
An.vagus	7.33	26.56		4.4
An.varuna		0.2		
Cx.epides		0.2		0.13
Cx.gelidus		0.93		
Cx.ludtzia		1		
Cx.quinqu	2.66	10.68		1.4
Cx.tritaeni				
Cx.vishnui	4.66	8.85		2
Cx.whitem		0.86		
Ma.annuli	1.33	3.08		0.13
Ma.uniform	0.66	1.16		0.13
Ae.aegypt		0.35		
Ae.albopic				
Ae.vittatus				
Armigeris		5.95		

5. COMPLETED STUDIES

5.1 Studies on protective immune response in experimental Filariasis.

Investigators:

Dr. B. Ravindran,
Ms. M.C. Mohanty,
Dr. P.K. Sahoo
Dr. A.P. Dash

Collaborators :

Dr. S. Rath & Dr. V. Bal
National Institute of Immunology, New Delhi

Starting date : March 1998

Closing date : August 2002

Aims and objectives:

i. To study protective immune responses in experimental filariasis by using genetically modified strains of mice.

ii. To understand the effector mechanisms involved in elimination of different developmental stages of filarial parasites.

iii. To study the role of different cytokines in regulation of microfilaraemia in experimental mice.

Results:

The objectives of the project was to use genetically modified strains of mice to study the role of different components of the immune system in protective immunity to filariasis. We had reported that XID mice (Btk deficient) are susceptible to both larval as well as microfilarial stages of filarial parasites. We had also demonstrated that the enhanced susceptibility was related to decreased Macrophage function in XID mice. Our previous studies have indicated that Ag-specific T cells respond equally well to Ag presentation by either *xid* CBA/N or MHC-matched wild-type CBA/J macrophages. LPS-mediated induction of IL-12 is better in *xid* than in wild-type macrophages as an indirect consequence of poor iNOS induction in *xid* macrophages. In contrast, one major defect we have already reported in Btk-deficient macrophages is the poor induction of iNOS and NO, and it was thus of interest to ask whether other effector functions of macrophages were also affected by the absence of functional Btk in *xid* mice. The bactericidal ability of *xid* macrophages was significantly poorer than that of wild-type cells (Fig.1). The wild-type cells reduced bacterial viability by >98%, while more than one-third of the input bacteria were still alive in the *xid* macrophage cultures. Upon stimulation, macrophages secrete TNF-a and IL-1β two major proinflammatory cytokines that have profound consequences on the efficacy of the innate effector immune responses during clearance of infections. The efficiency of induction of these cytokines in macrophages from *xid* or wild-type mice was examined by stimulating them *in vitro*

with bacterial LPS and estimating these cytokines in the culture supernatants 48 h later. The levels of induction of both cytokines (TNF-α and IL-1β) were higher in wild-type than in xid macrophages. Because the NF-$_{\kappa}$B family of transcriptional regulators has been shown to be important for microbicidal activity as well as the induction of expression of both TNF-α and IL-1β (Fig. 2), we examined whether *xid* macrophages also showed deficient induction of nuclear translocation of NF-$_{\kappa}$B. Three members of the NF-$_{\kappa}$B family, p50, p65, and c-*rel*, were examined by Western blot analyses of nuclear extracts from LPS-activated macrophages of either wild-type or *xid* mice. Induction of all three members of the *rel* family could be clearly observed (~3- to 5- fold in multiple experiments) in the case of wild- type macrophages, while *xid* macrophages showed no induction of either c-*rel* or p65, although some degree of p50 induction could be observed (Fig.3). We had reported earlier that anti-mf T cell responses in *xid* mice are skewed towards the production of Th1 cytokines such as IFN-g; since *xid* mice clear injected mf far more slowly than wild-type mice, it was possible that Th1 cell responses led to delay clearance of introduced mf in *xid* mice. To examine whether Th1/Th2-dominated anti-mf T cell responses could themselves have any major effect on the rate of mf clearance, we purified T cells from mf-infected wild-type or *xid* mice at day 15 post-injection and transferred them into naïve wild-type or *xid* mice. These recipients were then given mf and the kinetics of mf clearances were estimated over time. Wild-type mice showed unaltered rates of mf clearance whether they had been given T cells from mf-infected *xid* or wild-type donors, and *xid* recipients showed delayed clearance despite receiving T cells from wild-type mf-infected donors (Fig.4).

These data suggested that the T cell cytokine profile was not of crucially importance in causing the difference between mf clearance rates of wild-type vs *xid* mice. When actively motile mf of *S.digitata* were incubated *in vitro* with wild-type macrophages for 48 h, over two-thirds of them were rendered nonmotile (Fig.5a). However, if *xid* macrophages were used instead, over three-fourths of the mf retained excellent motility at the end of 48 h of co-incubation, demonstrating that Btk-deficient macrophages show poor microfilarial toxicity. The levels of NO induced in mf cocultures were significantly different between *xid* and wild-type cells (Fig. 5b). These data suggest that the major defect in *xid* macrophages for mediating mf clearance is the poor induction of NO.

Conclusion:

When the NF-$_{\kappa}$B inhibitor caffeic acid phenethyl ester was added to the macrophage-mf cocultures, there was a dramatic blockade to mf cytotoxicity,

accompanied by a reduction of NO induction, consistent with a crucial role for NF-$_\kappa$B induction in the expression of iNOS and the resultant mf toxicity exhibited by macrophages. These data suggest that Btk-mediated induction of NF-$_\kappa$B is crucial in mediating microfilaricidal functions of macrophages. Together, our findings show that, in Btk-deficient mice, compromised iNOS/NO induction in macrophages appears to be critically important in causing delayed clearance of microfilaraemia.

Publication from the project in peer reviewed journals:

1. S. Mukhopadhyay, P.K. Sahoo, A. George, V. Bal, S. Rath and B. Ravindran (1999) Delayed clearance of Filarial infection and enhanced Th1 immunity due to modulation of macrophage APC functions in XID mice. ***Journal of Immunology,*** 163, 1789-1792.

2. S. Mukhopadhyay, A. George, V. Bal, B. Ravindran and S. Rath (1999) Bruton's tyrosine kinase deficiency in macrophages inhibits nitric oxide generation leading to enhancement of IL-12 induction. ***Journal of Immunology,*** 163, 1786-1792.

3. S.Mukhopadhyay, M.C.Mohanty, A.Mangla, A.George,V.Bal,S.Rath and B.Ravindran (2002) Macrophage Effector functions controlled by Bruton's Tyrosine Kinase are more crucial than the cytokine balance of T-cell responses for microfilarial clearance. ***Journal of Immunology,*** 168: 2914-2921

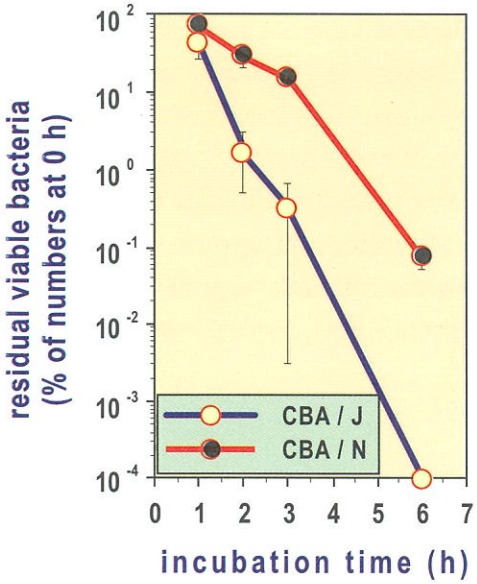


Figure 1.

Poor microbicidal activity in *xid* macrophages compared to wild-type ones. Pooled peritoneal macrophages from either wild-type (CBA/J) or *xid* (CBA/N) mice were incubated with opsonized *E. coli* for 10 min. Extracellular bacteria were killed using gentamycin and the surviving bacteria in the macrophages of both the strains of mice at various time points were estimated from macrophage lysates. The data are shown as percentage of bacteria at various time points of incubation with reference to the numbers found at 0 h of incubation in triplicate cultures (mean ± SE). Results are representative of four independent experiments.

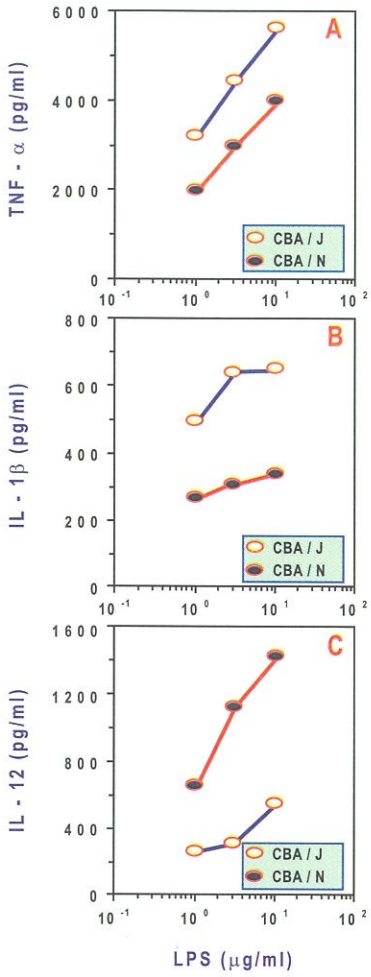


Figure 2.

Induction of TNF-a and IL-1β is poorer from *xid* macrophages than from wild-type cells. Peritoneal macrophages from wild-type (CBA/J) or *xid* (CBA/N) mice were cultured with titrating doses of bacterial LPS for 48 h, and levels of TNF-α (*A*), IL-1β (*B*) and IL-12 (*C*) induced were measured in the culture supernatants. The data are representative of three separate experiments.

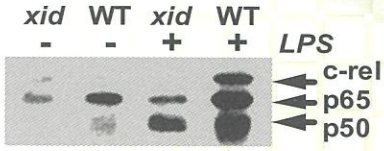


Figure 3.

Poor induction of rel family proteins in *xid* macrophages. Peritoneal macrophages from *xid* or wild-type (WT) mice were cultured in the presence or absence of 10 μg/ml of bacterial LPS for 48 h, and nuclear extracts were examined for levels of p65, p50 and c-rel proteins by Western blot analysis. The data shown are representative of three separate experiments.

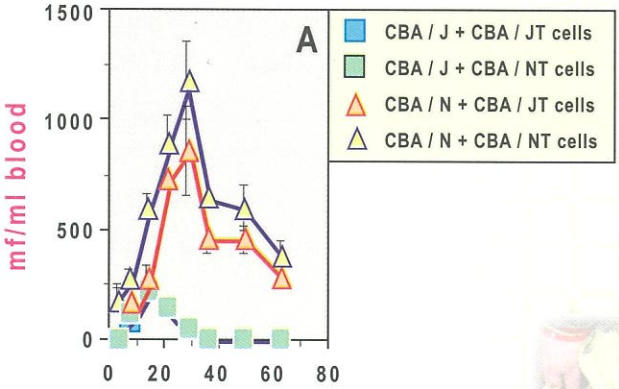
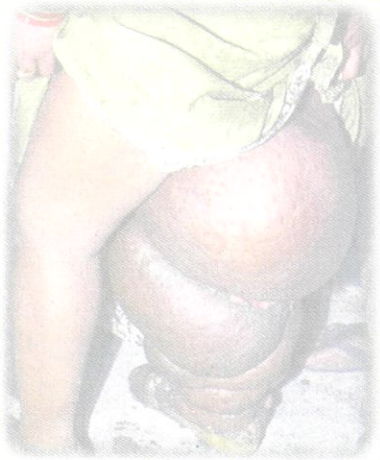


Figure 4.

Clearance of mf is not affected by the presence of Th1 T cells. *A*, Time course of microfilaraemia (mean ± SE) in groups (n=5) of mf-inoculated wild-type (CBA/J) mice or *xid* (CBA/N) mice receiving T cells from mf-injected wild-type or *xid* mice as shown.

B, Time course of microfilaraemia (mean ± SE) in groups (n=10) of mf-inoculated wild-type (DBA/2) mice or DBA/2-IFN-γ-/- mice is shown.

Data are representative of 2-3 independent experiments.



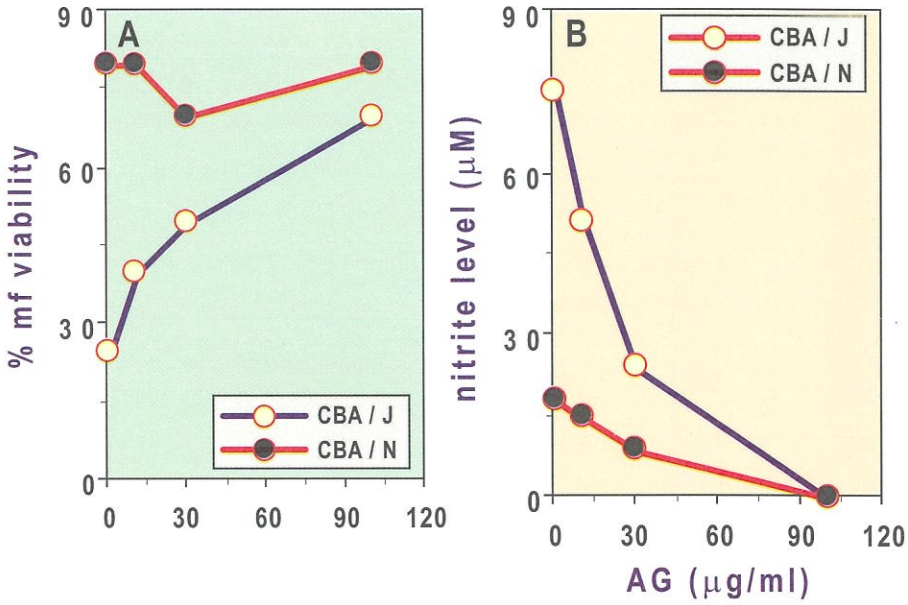


Figure 5a & 5 b.

NO-dependent macrophage toxicity towards mf *in vitro* is poor in *xid* macrophages. Peritoneal macrophages from wild-type (CBA/J) or *xid* (CBA/N) mice were co-cultured with active and viable *S. digitata* mf (1,000 mf/well) in absence or presence of various concentrations of AG for 48 h, and the motility and viability of mf (*A*) as well as the nitrite accumulation in the culture supernatants (*B*) estimated and are shown as mean ± SE in triplicate cultures. Data in *A* are expressed as the percentage of mf remaining viable in comparison to mf incubated without any cells. Results shown are representative of three independent experiments.

5.2 Development of a laboratory model for *W.bancrofti*

Investigators:
Dr. B.Ravindran,
Dr.A.K.Satapathy,
Dr. J.J. Babu Geddam,
Dr. M.C. Mohanty,
Dr. P.K. Sahoo,
Mr. B.R. Sahoo,

Stating date : March 1993
Closing date : August 2002

Aims and objectives:

i. To understand the biological factors associated with growth and development larval and microfilaraial stages of filarial parasites.

ii. To study the host responses and that result in elimination of filarial parasites from the infected hosts.

iii. To utilize the understanding from the above objectives to develop an animal model for microfilarial and larval stages of the human filarial parasite *Wuchereria bancrofti.*

Summary of work done:

The approach for development of an animal model for W.bancrofti needs to a rational basis since every attempt in the past has been unsuccessful. It was reasoned that it is crucial to initially understand the factors that contribute to elimination of filarial hosts conversely to understand the factors that support growth and development filarial larvae in mammalian host. The initial attempts were made to infect XID mice with *B.malayi* L3 and it resulted in growth and development of L3 into juvinile adults (please see under publications). Factors that could have contributed to increased susceptibility of XID mice to larval development was studied, one of the features being deficiency of B-1 cells, a class of B-lymphocytes in XID mice. These cells are known to respond to T-independent antigens and could have contributed to enhanced susceptibility of these mice to filarial infections. The issue was also addressed in gerbils which are widely used as animal models for filarial parasites. Groups of BALB/c mice, gerbils and XID mice were studied for antibody responses to T-independent antigens. Gerbils were found to be significantly deficient in eliciting antibodies to both dextran and phosphorylcholine (PC) in comparison to BALB/c mice. The antibody response of gerbils to T-independent antigens was found to be similar to the response observed in Bruton's tyrosine kinase (Btk) deficient XID mice, which are known to be poor responders to T-independent antigens. Similar to XID mice, normal gerbil sera were found to be deficient in naturally occurring antibodies to single stranded DNA (SS-DNA), lipopolysaccharide (LPS) and phospholipids. This raises the possibility of a deficiency of CD5 + B-lymphocytes (also known as B-1 cells) in gerbils, since deficiency of this sub-population of B-lymphocytes has been attributed to the absence of such naturally occurring antibodies in XID mice. These results indicate the need to study immunogenicity of parasite T-independent antigens and their relationship to protective immunity in parasite infections in gerbils.

Conclusions:

These and other investigations detailed in another completed project (please see above) identify three vital host components contributing to enhanced susceptibility of mammalian hosts to filarial parasites 1) Deficiency of antibody production to T-independent antigens; 2) Deficiency of nitric oxide production by host macrophages and 3) Polarization of immune response towards a Th1 type. Some of these immune

response phenotypes can be pharmacologically manipulated and could be used for development W. bancrofti in rodents.

Publication from the project in peer reviewed journals:

1. B.Ravindran, P.K.Sahoo, M.C.Mohanty, S.Mukhopadhya and A.P.Dash(1999) Increased susceptibility of mice with XID mutation to *Brugia malayi* infection. ***Medical Science Research***, 27,135-137.
2. M.C. Mohanty, P.K. Sahoo, A.K. Satapathy and B. Ravindran (2000). *Setaria digitata* infections in cattle: parasite load, microfilaraemia status and relationship to immune response. ***Journal of Helminthology***, 74: 343-347.
3. M.C.Mohanty and B.Ravindran (2002) Deficiency of antibody responses to T-Independent antigens in Gerbils, *Mariones unguculatus*. ***Developmental and Comparative Immunology***, 26: 385-391

5.3 Assessment of Disease prevalence due to leptospirosis.

Investigators :
Dr. B. Ravindran,
Dr. J.J.Babu Geddam,
Dr. P.K. Sahoo

Collaborator :
Dr. B. K. Das, SCB Medical College, Cuttack

Starting date : February 2001
Closing date : December 2001

Funding Agency :
ICMR Task Force (EM)

Objectives:

i. To assess the proportion of cases due to leptospirosis among all cases of acute febrile illness attending hospitals.
ii. To assess the incidence of severe complications due to leptospirosis.
iii. To map different regions for predominant infecting serotypes of leptospires.

Results:

This task funded project for one year revealed that 8.4% of the cases (satisfying the inclusion criteria) were due to leptospirosis. The prevalence in different areas and clinical history of all the positive cases are shown in tables 1 and 2. Environmental association of positive cases (Table 3) indicated that significant percentage of cases were associated with history of animal contact, water logging and rural background.

Place of Collection	Total number of samples	Dates of collection	Total positive cases (M+F)
SCB Medical College, Cuttack	324	Jan. - Dec. 2001	34 (27+7)
Dist. Of Boudh	10	27th & 28th July, 2001	Nil
Dist. Of Jajpur	9	31st July & 1st August, 2001	Nil
Dist. Of Kendrapara	8	8th & 9th August, 2001	Nil
Dist. of Keonjhar	60	29th & 30th August 2001	2 (1+1)
Kalinga Hospital, Bhubaneswar	14	August – December 2001	Nil

Total No. of cases : 425
Total No. Positive : 36 (8.4%)

Table 1:

Area wise sample collection for leptospirosis and positivity.

Fever	31	91%
Headache	13	39.4%
Chills	23	69.7%
Rigors	22	66.7%
Yellow conjuctive	16	48.5%
Vomiting	11	33.3%
Yellow urine	14	42.4%
Pain abdomen	5	15.2%
Olliguria	11	33.3%
Body ache	15	45.5%
Breathlessness	3	9.1%
Hemoptysis	2	5.8%
Cough	3	9.1%
Diarrhoea	5	15.2%

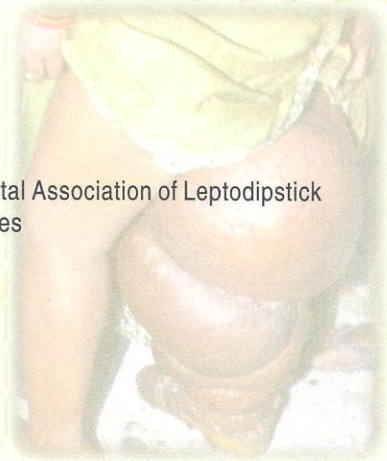
Table 2:

Clinical History Positive cases (n = 34)

	Number	Percentage
Animal contact	24	66.66%
Water logging	20	55.55%
Rural	24	66.66%

Table 3:

Environmental Association of Leptodipstick positive cases



Conclusions:

The study indicated a significant prevalence of Leptospirosis in Orissa, which was not recorded earlier to be prevalent.

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

Investigators:
Dr. G.Bulliyya,
Dr. S.S.S. Mohapatra, Dr.A.S.Kerketta,
Mr.R.K.Das,
Mr.P.K.Jangid

Starting date : January 2000;
Closing date : April 2002

Funding:
ICMR Extra-mural

Objectives:

i. To study the morbidity pattern of the elderly among three primitive tribal groups;
ii. To screen the malnutrition, dietary habits and food intake patterns;
iii. To compare the finding with tribal and non-tribal groups of other states and;
iv. To find out the possible causes and to suggest remedial measures.

The elderly population aged over 60 years was enumerated from the population list respectively at the Micro-projects. The proportion of elderly population is estimated to be around 6-7 percent of the total population. The three major primitive tribal groups include Paudi Bhuniya from Angul, Deogarh and Keonjhar districts, Lanjia Saura from Gajapati and Rayagada districts and Kondhs from Rayagada district and Kalahandi districts. The study sample was obtained by adopting purposive sampling method. Half of the villages were selected and all the elderly subjects available on the day of survey in each selected villages were included in this study. Different investigatory methods have been used for collecting village schedules, socio-economic status, diet survey, anthropometry, anaemia status and clinical examination.

Observations:

A total of 964 elderly subjects belonging to Paudi Bhuniya (454; males 186, females 268), Kutia Kondhs (248; males and 92 females 156) and Lanjia Saura (262; males 101 and females 161) primitive tribes were studied. The mean values of anthropometric parameters (age, body weight, height, armspan, mid-arm circumference, biceps and triceps skinfold measurements and haemoglobin) are not much different between groups. Chronic-energy deficiency (CED) is assessed using body-mass index (kg/m^2) as a nutritional index (Table 1). The proportion of normal (BMI>18.5) is around 10%, while 90% are in different grades of CED in the three tribal groups. Grade-II CED is more than grade-I and grade-III CED and the rates are greater in Paudi Bhuniya than in Lanjia Saura Kondhs. The prevalence of anaemia is ranged from 88.9% in Lanjia Saura to 94.2% in Paudi Bhuniya and Khonds (Table 2). The severity of mild and moderate grades of anaemia is more in Paudi Bhuniya, but severe grades of anaemia is 38.6% in Kondhs. Females suffer more than their male counterparts from both moderate and severe grades of anaemia in all the three primitive tribal groups. The hypertension for systolic blood pressure (SBP >140 mmHg) is found to be lower in Kondhs compared to Lanjia Saura and Paudi Bhuniya. While, the prevalence of hypertension for diastolic blood pressure (DBP>90 mmHg) is much higher among Lanjia Saura than among Kondhs.

Other than green leafy vegetables, the overall intake of foodstuffs among the Paudi Bhuniya (n=186), the Lanjia Saura (n=94) and Kondh (n=145) primitive groups

are much less than the intakes of general tribal and non-tribal population surveys conducted by NNMB (1996-97) for 10 states and the Recommended Dietary Intakes suggested for sedentary adults (currently no RDI is available for elderly Indians). These primitive groups are deficient for both protein and energy intakes. Almost all the nutrients were deficient in terms of quantity with an exception of vitamin-A intake, because of higher consumption of green leafy vegetables. Moreover, the intake of nutrients among the elderly populations are much deficient when compared with the Recommended Dietary Allowance for adult Indians. The overall results indicate that the elderly groups of primitive tribal are deficient in energy as well as food intake and a majority is suffering from iron-deficiency anaemia.

Table 1.

Prevalence of chronic-energy deficiency among three primitive tribal groups of Orissa

Nutritional grade /CED (BMI: kg/m^2)	Paudi Bhuniya (454)	Lanjia Saura (n=262)	Kondhs (n=248)
Normal (>20.0)	8.3 (38)	10.9 (29)	8.0 (20)
Below-normal (18.5-20)	20.0 (91)	19.1 (50)	24.4(61)
Grade-I CED/ mild (17.0-18.5)	33.4 (152)	31.2 (82)	28.2(70)
Grade-II CED/ moderate (16.0-17.0)	20.3 (92)	22.6 (59)	23.6(58)
Grade-III CED/ severe (<16.0)	18.0 (82)	16.2 (42)	15.8(39)

Table 2.

Prevalence of anaemia by severity among the elderly primitive tribal groups of Orissa

Anaemia grade by haemoglobin level*	Elderly primitive tribal groups		
	Paudi Bhuniya (604)	Kondhs (616)	Lanjia Saura (414)
	Males		
	(n =225)	(n =233)	(n=132)
Normal (≥13.0g/dL)	3.1 (19)	1.9 (12)	1.4 (6)
Mild (11.0-12.9g/dL)	5.3 (32)	5.7 (35)	4.1 (17)
Moderate (9.0-10.9g/dL)	19.5 (113)	15.4 (95)	12.1 (50)
Severe (<9.0g/dL)	9.3 (56)	19.0 (91)	14.3 (59)
	Females		
	(n=379)	(n =383)	(n=282)
Normal (≥12.0g/dL)	7.9 (48)	3.9 (24)	4.3 (18)
Mild (10.0-11.9g/dL)	12.4 (74)	9.6 (79)	8.0 (33)
Moderate (8.0-9.9g/dL)	31.6 (191)	24.8 (153)	29.7 (123)
Severe (<8.0g/dL)	10.9 (66)	19.6 (127)	26.1 (108)
	Total (males and females pooled)		
Normal	11.1 (67)	5.8 (36)	5.8 (24)
Mild	17.5 (80)	15.3 (114)	12.1 (50)
Moderate	51.2 (259)	40.3 (248)	41.8 (173)
Severe	20.2 (122)	38.6 (218)	40.3 (167)

Figures in parentheses indicate sample number. *WHO. Nutritional Anaemias. TRS:405 (1968)

5.5 Immune response to parasite lipids in human filariasis.

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

Starting date : 1995;
Closing date : 2001.

Objective:

i) To isolate lipids from the cattle parasite *Setaria digitata* and determine the immunological reactivity to these antigens in humans infected with *Wuchereria bancrofti.*

ii) To determine the immunodominant epitopes present in the lipid antigens.

Results:

The lipids were isolated from aqueous-insoluble residues of parasites by procedures developed in this centre, which completely removed the ubiquitous protein antigens. Antibodies to lipids in human filarial sera were determined through lipid-ELISA. The microfilaraemic subjects (AS) exhibited the lowest antibody levels and lowest seropositivity of IgG and IgM reacting with lipidic antigens isolated either from the adult or the microfilarial stages of the parasite. But the antibody levels and the rate of seropositivity were significantly higher in endemic normals (EN) and in chronic filariasis (CP) patients. Most (76% - 100%) of EN and CP were seropositive compared with only 28% - 48% of the AS. None of the non endemic normal, malaria and leprosy sera was found to be seropositive suggesting the filarial specificity of lipid antigens. Anti lipid antibodies were also found to be considerably elevated in *Brugia malayi* (L3) infected mastomys without microfilariae than in those animals with microfilariae. These data indicate that high antibody levels to lipid antigens are associated with microfilariae negativity. IgG subclass analysis revealed the predominance of IgG2 in AS, IgG3, IgG1 in CP and IgG1, IgG2 in endemic normals. The nature of antigenic determinant recognized by filarial antibodies was assessed by periodate treatment which indicated these antigens to be glycolipids. Carbohydrate recognition by filarial antibodies seems to be dissimilar in different clinical groups of filariasis and might modulate the course of infection in humans. Diethyl carbamazine treatment in AS subjects led to enhanced antibody response.

Conclusion:

The study reveals the presence of anti-lipid antibodies in human subjects infected with *W. bancrofti.* The levels of these antibodies were high in amicrofilaraemic subjects. The immunodominance of carbohydrate epitopes in filarial lipid antigens was demonstrated.

Publications from the project in peer reviewed journals

1. M.Bal, A. K.Satapathy and M. K. Das (1998). Increased antibody response to parasite lipids in amicrofilaraemic individuals from a region where *Wuchereria bancrofti* infection is endemic. ***Annals of Tropical Medicine and Parasitology,*** 92: 119-122.

A. K. Satapathy, M.S. Bal and M. K. Das (2000). Differential antibody response to parasite lipid antigens in lymphatic filariasis. ***Current Science,*** 78: 1371-1375.

5.6 Antigenecity of filarial enzymes in endemic population.

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

Starting date : 1993;
Closing date : 2001

Objective:

i. To characterize and establish the antigenicity of filarial enzymes namely Proteases, Superoxide dismutase and Glutathione-s-transferase in filarial infection.

Results:

Superoxide dismutase activity was determined in different stages of filarial parasites (human and cattle). The activity was almost undetected in microfilariae stage but the enzyme activity was high in adult worms. The enzyme was also detected in the *in vitro* released products of worms. The enzyme was characterized to be cu/zn superoxide dismutase. The enzyme activity was completely inhibited with IgG antibody from chronic patients in contrast to IgG from normal people. Elevated levels of IgG and IgM antibody to this enzyme could be detected in individuals infected with *W. bancrofti*.

On the other hand individuals from non-filarial regions did not have antibodies to the enzyme.

Glutathione-s-transferase activity was detected only in adult stage of *Setaria digitata*. The activity was enhanced twenty five fold following purification of adult parasites on glutathione agarose column. IgG and IgM antibody levels to the enzyme were detected predominantly (90%) in *W. bancrofti* infected individuals compared with normal residents of endemic regions. Filarial sera in contrast to non-filarial caused reduction in the enzymatic activity.

A protease fraction (110 Kda) was purified from the adult cattle parasite *Setaria digitata*. Elevated levels of antibodies to protease were observed in asymptomatic microfilaraemic individuals compared to the normal people of endemic regions. Such distinction was however not observed with the whole antigenic extracts of the adult worms. The potential of the protease as immunodiagnostic antigen was indicated. Evaluation of IgG subclass response to the protease indicated the dominance of IgG4 antibodies in AS subjects and of IgG1 in those with chronic filariasis patients. When IgG4 subclass serology using the protease antigen was assessed, 47 of 50 microfilaraemics, 20 of 50 endemic normals, 23 of 50 chronic patients and no non-endemic normals were found seropositive. IgG4 was detected in 35 out of 70 children (aged <12 years) who appeared amicrofilaraemic and 38 of 40 microfilaraemic children. Appreciable levels of specific IgE which correlated with those of IgG4 were detected in

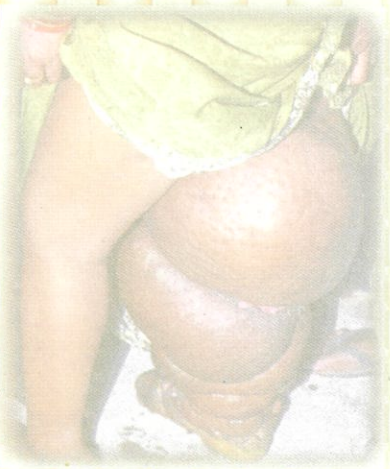
filarial groups. A low molecular weight (30 Kda) protease was characterized to be zinc dependent cystiene protease. It was demonstrated to have allergenic activity. The extent of immediate type of hypersensitivity (ITH) positivity to the protease in infected humans ranged from 20% for CP groups to 56% in AS carriers. However about 62% of EN were also ITH positive. Antibodies from different groups of filarial sera was studied on the protease activity. IgG from chronic patients was able to neutralize the proteolytic activity completely. IgG from EN and AS subjects only caused partial inhibition and IgG from non-endemic normals was ineffective. These results indicate that neutralizing antibodies to filarial proteases were generated during natural course of human filariasis. The generation of inhibitory antibodies appears to depend on the severity of infection.

Conclusion:

Three biologically important filarial enzymes such as Proteases, Superoxide dismutase and Glutathione-s-transferase have been characterized. The immunodiagnostic potential of filarial enzymes especially a protease (110 Kda) and Glutathione-s-transferase was noted. Antibodies inhibitory to the function of these enzymes were shown to be generated during the course of *W.bancrofti* infection in humans. These antigens (Protease and Glutathione-s-transferase) elicited selectively IgG4 antibodies. A low molecular weight (30Kda) zinc-dependent cysteine protease was characterized as an allergen (IgE antibodies and immediate type of hypersensitivity reaction) in humans exposed to filariasis.

Publications from the project in peer reviewed journals

1. M. Bal and M. K. Das (1994). Immunodiagnostic ptential of a filarial protease. ***Current Science,*** 67: 1018-1019.
2. M. K. Beuria, M. Bal and M.K. Das (1995). Allergic reactivity and IgG subclasses to a protease fraction of *Setaria digitata* in filariasis. ***Journal of Helminthology,*** 69: 181-185.
3. M. Bal and M. K. Das (1995). Antigenicity of filarial superoxide dismutase in human bancroftian filariasis. ***Journal of Biosciences,*** 20: 157-166.
4. M. Bal and M. K. Das (1996). Inhibition of filarial proteases by antibodies from human filariasis. ***Current Science,*** 71: 519.
5. M. Bal and M. K. Das (1996). Glutathione-binding proteins of *Setaria digitata*: antibody responses in human infected with *Wuchereria bancrofti.* ***Parasite Immunology,*** 18: 473-477.
6. M. Bal and M.K. Das (1999). Antigenicity of filarial protease from *Setaria digitata* in *Wuchereria bancroftian* infection. ***Annals of Tropical Medicine and Parasitology,*** 93: 279-288.



5.7 Studies on sibling species of Orissa

Aims and Objectives:

i. To find out different sibling species complex and their prevalence in different geo physiographical regions of the state.

ii. To assess the susceptibility status of the sibling species complex to different insecticides.

iii. To study the bionomics of the complex like age composition, anthropophilic index, gonotrophic cycle etc.

iv. To develop suitable control methods based on the above work..

Investigators :

Dr.N.Mahapatra,
Dr.R.K.Hazra,
Dr.S.K.Parida,
Mr.D.P.Hansdah
and Mr.N.S.Marai

Starting date : January 1999

Closing date : January 2002

Table:

Sibling species distribution in relation to malaria in different geophysiographical areas of Orissa.

Area	Species	% of Complex	Anthr ophilic Index (%)	S.P.R.	Average	S.F.R.
Central tableland						
Nayagarh (Gania)	An.culicifacies - B An.culicifacies - C	67 33	18 43	13.2		11.3
Anugul (Bantala)	An.culicifacies - B An.culicifacies - C	62 38	15 35	17.2	16.4	15.3
Dhenkanal (Birosal)	An.culicifacies - B An.culicifacies - C	58 42	15 27	18.4		14.36
Northern plateau						
Telkoi	An.fluviatilis, T An.culicifacies - B An.culicifacies - C	18 62 48	 25 38	23.6		23.6
Keonjhar	An.fluviatilis, T An.culicifacies - B An.culicifacies - C	10 55 45	22 22 31	14.9	19.2	13.8
Coastal belt						
Puri	An.culicifacies - B	100	21	2.5		0.5
Ganjam	An.culicifacies - B An.culicifacies - C	52 48	17 23	15		12
Kendrapara	An.culicifacies - B	100	-	1.07	7.5	-
Jajpur	An.culicifacies - B	100	-	6		3.8
Jagatsingpur	An.culicifacies -B	100	13	1.9		1.25
Khurda (Gambharimunda)	An.culicifacies - B An.culicifacies - C An.fluviatilies - T	70 30 100	12 21 40	8.8		8.1

Observation:

The distribution of sibling species complex of *An. fluviatilis* & *An. Culicifaci* studied in 3 different geophysiogrphic region i.e. central table land , northen plateau , coastal belt has been given in table below. *An. culicifacies* was found to be prevalent in all the 3 geophysiographic region whereas, *An. fluviatilis* was encountered in northen plateaus and in only one area in coastal belt which is a hilly area. The malaria incidence was highest in northern plateau (SPR 19.2) followed by central table (16.4) and coastal belt (7.5). The anthroprophillic index was found to be 24- 43 % in *An. culicifacies* C & 12- 21% for *An. culifacies* . *An. culifacies* C was more prevalent where malaria incidence (SPR) was more than 10% & *An.culicifacies B* was present where malaria incidence was very low (0.5-6%). Apart from the above two vectors *An. annularis* , the known vector was more prevalent in the coastal belt.

Conclusion:

Sibling species complex of *An culicifacies* and *An fluviatilis* were found in the all the three geophysiographical region of the state. Basing on these findings an in depth study has been proposed for malaria stratification of endemic districts of Orissa.

5.8 Operational feasibility and efficacy of co –administration of Albendazole and DEC in controlling / elimination of lymphatic filariasis.

Investigators :

Dr. G.P.Chhotray,
Dr. N. Mohapatra,
Dr. M.R.Ranjit,
Dr. R.K.Hazra,
Dr. S. K. Parida,
Mr. H.K. Khuntia,
Mr. N.S. Marai,
Mr. D..P. Hansdah

Starting date : February 2001;
Closing date : January 2002

Funding :

ICMR Task force (A multicentric project)

Objectives:

i. To compare mass annual single dose DEC alone with co – administration of albendazole and DEC for filariasis control / elimination – district as a unit.

ii. Training of local health authorities (state and district) for implementation, monitoring and evaluation.

This was a multi centric community based operational research project having components like (i) Baleline evaluation, (ii) implementation by State Health Dept. and (iii) Evaluation of programme (process and impact). National Anti Malaria Programme (NAMP) was the nodal agency for assisting implementation of the programme through the State Govt. Health authority and RMRC (ICMR), Bhubaneswar was to evaluate the successs of the programme in Orissa.

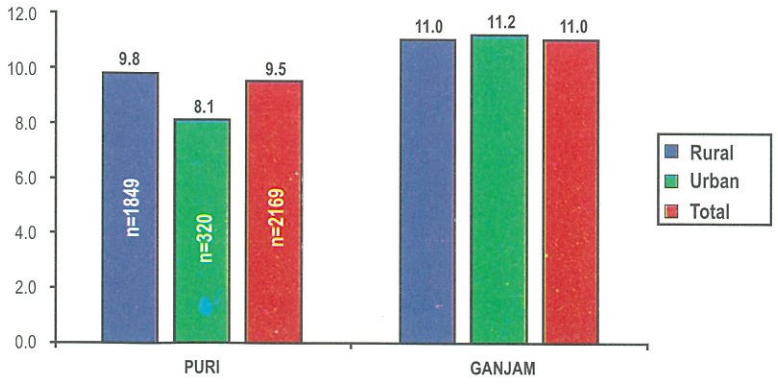
Since no base line data on prevalence Microfilaraemia (Mf), disease and geo – helminthics was available in the operational areas, a survey was conducted in Puri and Ganjam district first to identify the filarial endemic villages by cyclic systematic procedure and second to select 6 sentinel / 6 spot check villages for rural areas and 2 sentinel / 2 spot check wards for urban areas by cluster analysis.

From the study the Mf rate / disease rate was found to be 11.0% / 7.9% and 9.5% / 8.7% in Ganjam and Puri district respectively. However no significant difference in the frequency of the microfilaraemia and disease was observed between the rural and urban areas (Fig 1 and 2). The antigenaemia rate detected by ICT kit was found to be more in Ganjam district than Puri but no significant difference in the frequency of distribution was observed between the rural and urban areas (Fig 3 &4).

The geo-helminth rate was found to be 39.7% in Ganjam and 33.9% in Puri district by Kato – Katz technique.

The mass drug administration was conducted by the state State Govt. Health authority in 27th January 2002. The project has been closed by ICMR since 30th January 2002 after MDA. The post MDA assessment was carried out under another project of the centre given under on going activities.

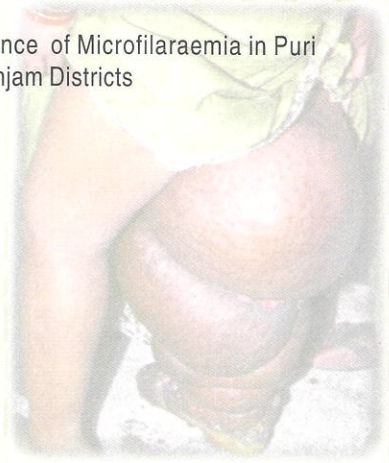
The baseline entomological survey was conducted in the Ganjam and Puri district to have the base line data on transmission parameters before the mass drug administration aiming one of the objectives of the above project i.e. impact of DEC – Albendazole on transmission parameters of the vector Culex quinquefasciatus. From each district six sentinel and six spot check villages were selected by sampling method. Base line entomological survey started from mid of November 2001.Six sentinel and one spot check village from Puri district and Six sentinel village from Ganjam district had been surveyed once as per the protocol. The vector Cx.quinquefasciatus was found to be the dominant species. The infection and infectivity rate ranged between 0.58 to4.65% and 2.32 to 2.81% respectively.



Antigenaemia prevalence in Puri and Ganjam District

Fig 1:

Prevalance of Microfilaraemia in Puri and Ganjam Districts



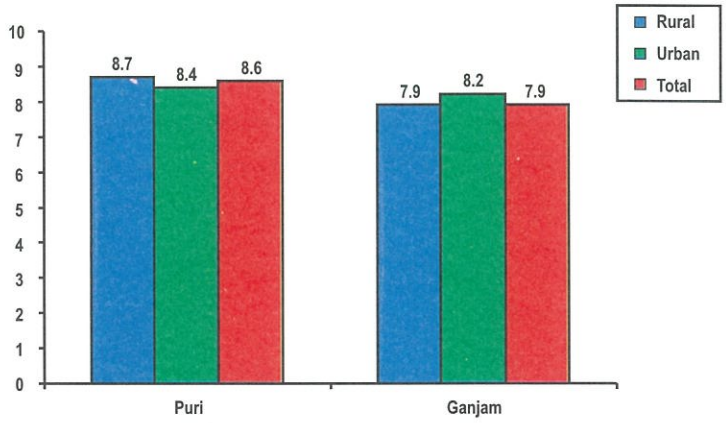


Fig 2:

Disease prevalence (Acute + Chronic) in Puri & Ganjam District

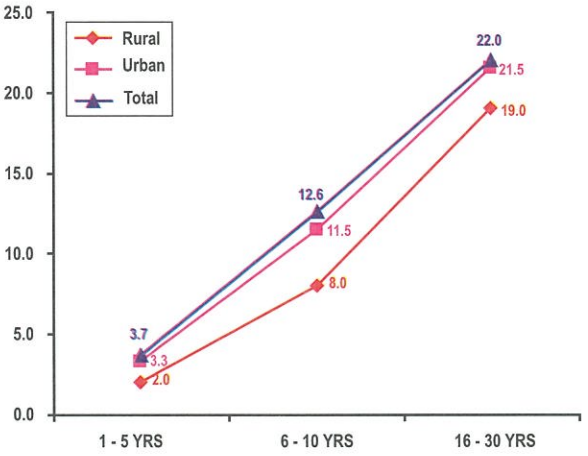
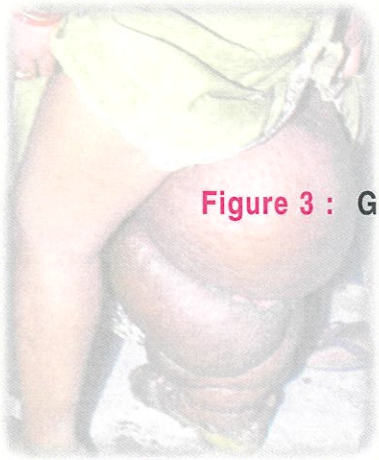


Figure 3 : Puri



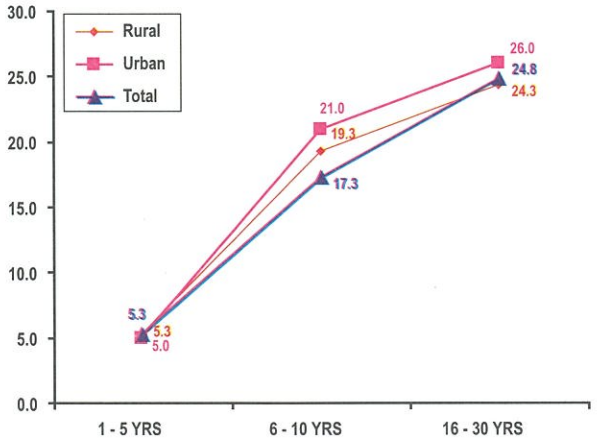
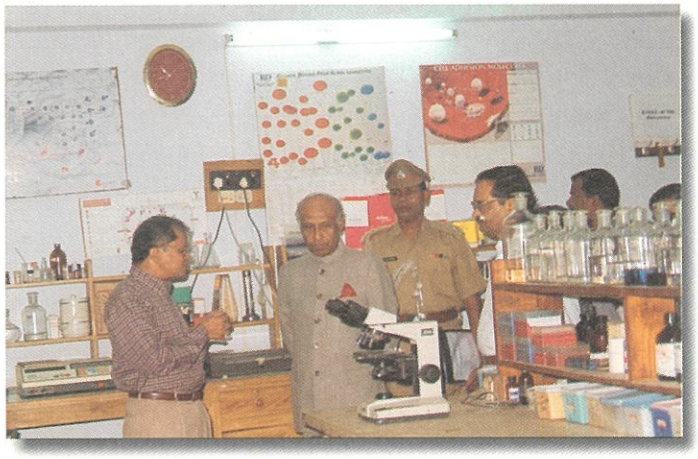


Figure 3 : Ganjam



Visit of

His Excellency

Sj. M.M. Rajendran

Governor of Orissa

to

RMRC Laboratory

on

6th November 2002

6. GENERAL INFORMATION

6.1 Papers Published (2001-2002):

1. B. Ravindran (2001). Filariasis Control: Ethics, Economics and Good Science. ***The Lancet***, 358: 246.
   (Impact Factor = 10.197)

2. G.P. Chhotray, M. Mohapatra, A. S. Acharya and M. R. Ranjit (2001). A clinico - epidemiological perspective of lymphatic filariasis in satyabadi block of Puri district, Orissa. ***Indian Journal of Medical Research*** , 114 : 65 – 71.
   (Impact Factor = 0.365)

3. A. P. Dash, G. P. Chhotray, N. Mohapatra and R. K. Hazra (2001). Retrospective analysis of epidemiological investigation on Japanese encephalitis outbreak occurred in Rourkela, Orissa, India. ***Southeast Asian Journal of Tropical Medicine and Public Health***, 32(1) : 137 – 139.

4. A. Mahapatra, J.J.B. Geddam, N. S. Marai, B. Murmu, G. Mallick, A. S. Acharya, G. Bulliyya and K. Satyanarayana (2001). Nutritional status of rural Oriya women from drought affected Kalahandi district of Orissa. ***Indian Journal of Nutrition and Dietetics***, 38(11): 403-411.

5. B.V. Babu, G.P. Chhotray, R.K. Hazra and K. Satyanarayana (2001). Community perception of a district health system. ***Journal of Health Management***, 3 (1): 1-13.

6. A.N. Nayak and B.V. Babu, (2001) – Utilisation of services related to safe motherhood among the scheduled castes and scheduled tribes of Orissa: an overview. ***South Asian Anthropologist***, 1 (2): 117-122.

7. A.N Nayak, A.S. Acharya, P.K. Jangid, K. Dhal and B.V. Babu. (2001) Lymphat ic filariasis related knowledge and beliefs among diseased and normal people in rural coastal Orissa, India. ***Tropical Biomedicine,*** **18** (2)***:*** 97-102.

8. R.S.Balgir (2001) Indigenous and Independent origin of BS- Mutation in Ancient India: Is it a myth or reality? ***Mankind Quarterly***, **42**: 99-116.

9. B.V. Babu, A.S. Acharya, G. Mallick, P.K. Jangid, A.N. Nayak and K. Satyanarayana (2001). Lymphatic filariasis in Khurda district of Orissa, India: an epidemiological study. ***Southeast Asian Journal of Tropical Medicine and Public Health***, 32 (2): 240-243.

10. B. Ravindran (2002). Mass drug administration to treat lymphatic filariasis. ***The Lancet***, 359 (9321): 1948.
(Impact Factor = 10.197)

11. S. Mukhophadya, M. C. Mohanty, A. Mangla, A. George, V. Bal, S. Rath and B.Ravindran (2002). Macrophage effector functions controlled by Bruton's Tyrosine Kinase are more crucial than the cytokine balance of T-cell responses for microfilarial clearance. ***Journal of Immunology***, 168: 2914-2921.
(Impact Factor = 7.145)

12. P.K.Sahoo, J.J. Babu Geddam, A.K.Satapathy, M.C.Mohanty, B.K.Das, A.S.Acharya, N.Mishra and B.Ravindran (2002). Human Bancroftian Filariasis-A 13 year follow-up of Microfilariae carriers and Endemic Normals in Orissa, India. ***Parasitology,*** 124: 191-201.
(Impact Factor = 2.206)

13. M.K. Beuria, M.S.Bal, N.N. Mandal, M.K.Das (2002) Antigenemia 10 years after diethylcarbamazine treatment of asymptomatic microfilaraemic individuals: marginal conversion to infection- free state,. ***Parasite Immunology***, **24**(2): 109-111.
(Impact Factor = 2.014)

14. G. P. Chhotray, B. B. Pal, H. K. Khuntia, N.R. Choudhyry, S. Chakraborty, S. Yamasaki, T. Rammurthy, T. Takeda, S.K. Bhatacharya and G.B.Nair. (2002). "Incidence and molecular analysis of *Vibrio cholerae* associated with cholera outbreak subsequent to the supercyclone in Orissa, India" ***Epidemiology and Infection***, 128: 131-138.
(Impact Factor = 1.480)

15. M.C. Mohanty and B.Ravindran (2002). Deficiency of antibody responses to T-Independent antigens in Gerbils, *Mariones unguculatus*. ***Developmental and Comparative Immunology***, 26: 385-391.
(Impact Factor = 1.318)

16. B.V. Babu, A.N. Nayak, K. Dhal, A.S. Acharya, P.K. Jangid and G. Mallick, (2002). The economic loss to individuals with chronic lymphatic filariasis in rural communities of Orissa, India. ***Acta Tropica***, 82 (1): 31-38.
(Impact Factor = 1.0)

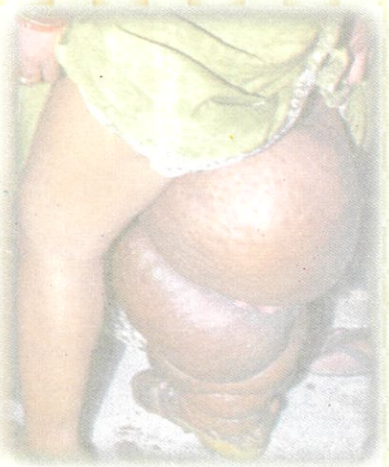
17. R.S. Balgir, A. S. Kerketta, B. Murmu and B. P. Dash (2002). Clinical Assessment of the Health and Nutritional Status of Ashram School Gond Children of Kalahandi District in Orissa. ***Indian Journal of Nutrition and Dietetrics***, 39:31-37.

18. G. Bulliyya, S. S. S. Mohapatra, A. S. Kerketta, R. K. Das and P. K. Jangid (2002). Status of anaemia among the elderly Paudi Bhuniya Primitive tribe of Sundergarh district, Orissa. ***Indian Journal of Nutrition and Dietetics*** (38), 403 - 411.

19. A.N Nayak, P.K. Jangid, A.S. Acharya and B.V. Babu. (2002) Lymphatic filariasis, household environment and human behaviour: a study among the rural population of coastal Orissa. ***Journal of Human Ecology,*** **3** (4): 283-286.

20. R.S. Balgir (2002) The genetic burden of hemoglobinopathies with special reference to community health in India and challenges ahead. ***Indian Journal of Hematology and Blood Transfusion.***, **20**: 2-7.

6.2 Chapters in Books:



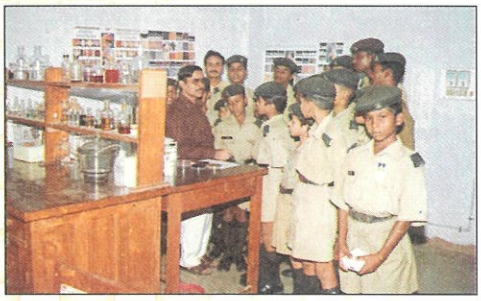
1. R. S. Balgir (2001). Biomedical Anthropology in the Service of Mankind in the New Millennium: Are We Ready? In: Anthropology: Trends and Applications. Bhasin MK and Malik SL (Eds.). Kamala Raj Enterprises, New Delhi.141-147.

2. B. Ravindran (2002) Natural History of Human Filariasis – The Elusive Road. Published in the World Class Parasites: Volume 5 "The Filaria" edited by Thomas R. Klei, T. V. Rajan, Series Editors Samuel J. Black, University of Massachusetts, Amherst, MA, U.S.A. and J. Richard Seed, University of North Carolina, Chapel Hill, NC, U.S.A.and Publisher Kluwer Academic Publishers, Boston. Page No.87-96.

6.3 Meetings / Seminars / Symposia attended:

Dr S.K.Kar

1. Delivered a lecture on "Recent advances in Filariasis" at Kalinga Hospital on 11th August 2001 as invited guest speaker.
2. Attended a meeting on Mass Drug Administration of DEC and DEC+Albendazole in 3 districts of Orissa (Puri, Ganjam & Balasore) under the Chairmanship of Principal Secretary, H & F.W., Govt. of Orissa at Orissa Secretariat on 24th August 2001.
3. Attended "Entrepreneurs Meet on Biotechnology (Orissa)" on 4th September at Swasti Plaza, Bhubaneswar.
4. Co-chaired scientific session on "Liver Diseases" at API State Branch Conference held at Suchana Bhawan, Bhubaneswar on 8th September 2001.
5. Participated in Annual Conference of Cardiological Society of India, Orissa Branch at S.C.B.Medical College, Cuttack on 16th September, 2001.
6. Attended a meeting (Assessment of Prevalence of IDD Surveys in different selected regions of the country - meeting of the Principal Investigators of Regional Centres) at NIN,Hyderabad on 21st September 2001.
7. Participated a Workshop (Orissa NFHS-2 Findings Dissemination Workshop) at Swasti Plaza on 22nd September, 2001, organised by State Health Department and UNICEF.
8. Attended SAC meeting of VCRC, Pondicherry held on 8-10th November 2001.
9. Attended 21st Annual Conference of Physicians of India (Orissa State Branch) and delivered a Guest Lecture on "Recurrent Filarial Lymphangitis Incidents in Orissa and its Management" held at S.C.B.Medical College, Cuttack on 10-11th November, 2001.
10. Delivered a guest lecture on "Rational Drug Therapy" at S.C.B.Medical College, Cuttack on 11th November, 2001 at XI Annual Conference of Indian Pharmacological Society.
11. Participated attended "42nd Annual Conference of Indian Society of Haematology & Transfusion Medicine(ISHTM)" as Chairman, Reception Committee at Bhubaneswar on 23-25th November, 2001.
12. Attended "9th National Children's Science Congress-2001" at Hotel Siddarth on 25th November, 2001 and delivered a lecture on "Progress in health sciences today".
13. Attended the meeting on Social Mobilization and Community Education (SMCE) Strategy in selected study districts - Review meeting held at Dte. Of NAMP Delhi on 27th November 2001, as invited by NAMP.
14. Attended a Workshop as invited speaker on "Leprosy" organised by LEPRA India in collaboration with Govt. of Orissa on 10-11th December 2001, and delivered talk on "Current Perspective of Leprosy".



Visit of School students to RMRC Laboratory on ICMR Foundation Day Celebration

15. Attended a "Meeting on Preparation of a Contingency Plan for Biological Disasters in Orissa" at SIHFW on 13th December, 2001, as invited by State Health Department, Govt. of Orissa and delivered talk on "Biological Disasters".
16. Attended a meeting on Task Force Co-administration of DEC + Albendazole in Lymphatic Filariasis at ICMR head quarters on 20th December, 2001 and presented the progress of works.
17. Attended a meeting of "Technical Advisory Group on Lymphatic Filariasis Elimination (LFE) as a member held at Nirman Bhavan on 21st December 2001.
18. Attended Gynecological & Obstetrics Conference at Hotel Swasti Plaza on 6th January 2002.
19. Attended Review Meeting with Government. of Orissa held on 7.1.2002 at Hotel Meghdoot.
20. Attended meeting of the ICMR Directors at NICED, Calcutta from 2-3rd February 2002.
21. Attended and delivered a talk on IDD at State level Sensitization Workshop on Control of Iodine Deficiency Disorders on 8th February 2002 at State Institute of Health & Family Welfare, Bhubaneswar
22. Participated in the 6th International Symposium on Vectors & Vector Borne Diseases, at Swasti Plaza, Bhubaneswar on 9th -11th February 2002.
23. Participated in ICMR-Ellison Foundation sponsored Workshop on Immunoparasitology from 11th-15th February 2002 at Crown Hotel, Bhubaneswar and delivered talk on epidemiology of lymphatic filariasis.
24. Attended the Health Strategy Development meeting of Govt. of Orissa on 20th March 2002 at State Institute of Health & Family Welfare, Bhubaneswar.

Dr. M.K.Das

25. Presented an invited talk entitled, "Endemic normals in filarial endemic regions: An immunological appraisal" in 10th Annual Meeting of Molecular Immunology Forum (22-24 February 2002) at Shantiniketan, West Bengal.
26. Participated in the 6th International Symposium on Vectors & Vector Borne Diseases, at Swasti Plaza, Bhubaneswar on 9th -11th February 2002.

Dr. B. Ravindran

27. Participated in the UNDP/World Bank/WHO sponsored conference on Filariasis at Hamburg, Germany from 19th – 22nd September 2001. Presented a paper entitled "Bancroftian Filariasis: Differential response of IgA and IgG3 in Endemic Normals and Chronic disease".
28. Was an invited participant in the XXVIII Annual Meeting of the Indian Immunology Society, held at AIIMS, New Delhi from 4th–6th October 2001.

Presented a paper entitled, "Effector Mechanisms of Protective Immunity in Lymphatic Filariasis: Lessons from mice and men".

29. Participated in the 6th International Symposium on Vectors & Vector Borne Diseases, at Swasti Plaza, Bhubaneswar on 9th 11th February 2002.
30. Was an invited participant in the Indo-German workshop on Tropical Disease at RMRC, Port Blair from 22nd – 24th February 2002. Presented a paper entitled, "Acquired Protective Immunity in Human Filariasis: Virtual Reality ?"
31. Was an invited participant in the Indo-French workshop on Functional Genomics in Health and Agriculture held at Indian National Science Academy, New Delhi from 3rd – 6th March 2002.

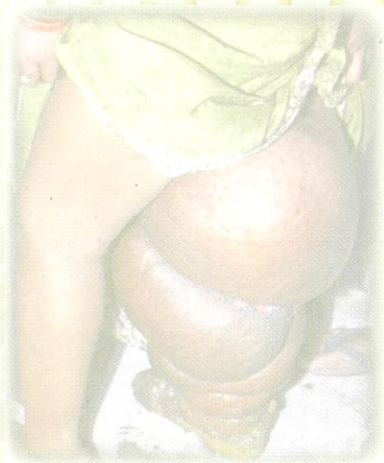
Scientific address by Prof. Basudev Kar on ICMR Foundation Day Celebration

Dr. R.S.Balgir,

32. Participated in ICMR-WHO Workshop on "Use of Information Technology in Biomedical Research" held during 5-7th September 2001, NICED, Kolkata.
33. Presented an invited paper entitled "Tribal Health Care for Common Genetic Disorders with special reference to Health Status, Needs and Operational Research in India" in the 89th Indian Science Congress held during 3-7th January 2002, Lucknow.
34. Participated in "ICMR Meeting on Strengthening of Research Capacity" held during 9-11th April 2001, Mumbai.
35. Participated as a Governing Council Member in the Annual Governing Council Meeting of the Indian Society of Human Genetics held on 14th February 2002, Trivandrum.

Dr. G.P. Chhotray

36. Attended the 6th International Symposium on Vectors and Vector Borne Diseases organized by National Acaedemy of Vector Borne Diseases from 9th–10th February 2002 at Bhubaneswar and presented the paper entitled "A clinicopathological and epidemiological study on lymphatic filariasis in an endemic area of Orissa".
37. Was invited to participate in International seminar on "Human genetics, Health & Ethical issues", 24th – 26th March 2001, organized by Utkal University, Bhubaneswar.
38. Attended the workshop on HIV / AIDS organized by R.M.R.C., Bhubaneswar in March 2002.
39. Attended the meeting on Indo – Korean vaccination programme on diarrhoeal disorders held at ICMR Hq, New Delhi from 18th – 19th June 2001.
40. Attended 29th Annual Conference of IAPM, Orissa Chapter at MKCG Medical College, Berhampur on 8th September 2001.



41. Attended the 42nd Annual National Conference of Indian Society of Haematology and Transfusion Medicine held at Bhubaneswar from 23rd to 25th November 2001 and chaired a scientific session on "Clinical approach to Thrombophillia".

42. Attended the National Seminar on "Biotechnology: Microbes to Man" organized by School of Life Sciences, Utkal University, Bhubaneswar from 30th to 31st March 2002 and presented a paper entitled "Molecular characterization of aetiological agents in diarrhoeal outbreak with reference to Vibrio cholerae in some coastal district of Orissa".

Dr. S.S.S. Mohapatra

43. Attended the ICMR meeting on Strengthening Research Capacity, held at Tata Memorial Hospital conducted by IRR, Mumbai, from 9 – 11 April'2001.

Dr. N. Mohapatra

44. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002

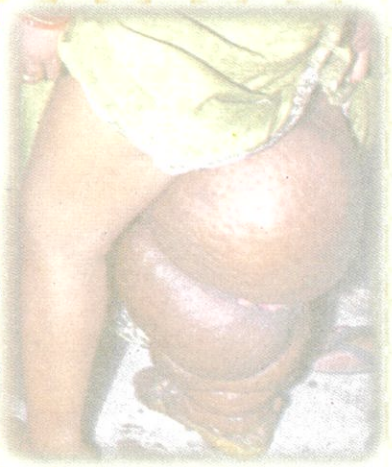
45. Attended a workshop on Ethics in Biomedical Research at National Institute of Cholera and Enteric Diseases, Kolkata from 29th to 31st May,2001.

Dr. B. V. Babu

46. Attended Protocol Development Workshop for Research on Drug Delivery Strategies for Lymphatic Filariasis in Urban Areas, organized by UNDP/ World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), as Temporary Advisers, held at NICD, Delhi during 14 – 17 May 2001.

47. Attended a meeting on mass drug administration of DEC and Albendazole in 3 districts of Orissa under the chairpersonship of the Principal Secretary, Ministry of health and Family Welfare, Govt. of Orissa at Orissa Secretariate, Bhubaneswar, on 24 August 2001.

48. Conducted training workshops for core trainer from four districts of Orissa, with regard to mass drug administration of DEC and albendazole, during 26 and 27 December 2001. The officer has spoken on the programme for elimination of lymphatic filariasis.



M.R.Ranjit

49. Attended the ICMR–Ellision foundationsponsored workshop on Immunoparasitology held at Bhubaneswar from 11th to 15th Febuarary 2002.

50. Attended the 6th International symposium on Vectors and Vector Borne Diseases organized by National Academy of Vector Borne Diseases from 9th 11th Feb 2002 at Bhubaneswar and presented the paper entitled "Is asymptomatic microscopic haematuria, a clinical presentation, associated with lymphatic filariasis in endemic areas of Orissa, India.

Dr. G. Bulliyya:

51. Attended ICMR Meeting on Strengthening of Research Capacity held at Tata Memorial Hospital and conducted by Institute for Research in Reproduction, Parel, Mumbai from 9th – 11th April 2001.
52. Attended 'XXXIV Annual Conference of Nutrition Society of India', held at M.P.Academy of Administration, Shahpura, Area Colony, Bhopal "Nutritional assessment among the elderly Paudi Bhuyan Primitive Tribe of Orissa" from 5th – 6th December 2001.
53. Attended a review meeting of DEC-Albendazole co-administration Project held on 4-12-2001 at RMRC, Bhubaneswar from 4th November 2001.
54. Participated in a State-level sensitization workshop on "Control of Iodine Deficiency Disorders", held at State Institute of Health & Family Welfare, Directorate of Field Publicity, Govt of India, Bhubaneswar as 'Resource Person' and presented a paper on 'Iodine deficiency disorders with particular reference to Orissa' on 8th February 2002.

Dr. A. K. Satapathy

55. Attended the 6th International Symposium on Vectors and Vector Borne Diseases held at Bhubaneswar from 9th to 11th February 2002.
56. Attended the ICMR-Ellison Foundation Workshop on Immunoparasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Dr. B.B. Pal

57. Attended the 29th annual conference of Orissa chapter of IAPM at MKCG Medical College, Berhampur on 8th September, 2001.
58. Was invited as a resource person delivered talk on "Cholera and its fatality in Orissa" at the Annual conference of zoological society of Orissa on role of zoology in Bioterrorism" at Utkal University, Bhubaneswar, 30 – 31st December, 2001.

Dr. S.K. Parida

59. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

Dr. R.K. Hazra :

60. Delivered a guest lecture on "Epidemiology of Falciparum Malaria" in CME on Severe and Complicated Falciparum Malaria (API, State Chapter) at S.C.B. Medical college, Cuttack on 12th May 2001.

61. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

Dr. B.P. Dash

62. Attended the 42nd Annual National Conference of Indian Society of Haematology and Transfusion Medicine held at Bhubaneswar from 23rd to 25th November 2001.

Mr. A.S. Acharya

63. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002 to present an abstract on "Approximation of lethal doses by logit analysis"

Dr. M.C. Mohanty

64. Presented a paper entitled, " Bancroftian Filariasis – A role for IgA antibodies in protective Immunity" in the 6th International Symposium on Vectors and Vector Borne Diseases held at Bhubaneswar from 9th to 11th February 2002.

Dr. P.K. Sahoo

65. Presented a paper entitled, "Human Filariasis: Lymphoedema and Hydrocele are Immunologically distinct" in the 6th International Symposium on Vectors and Vector Borne Diseases held at Bhubaneswar from 9th to 11th February 2002.

Mr. N. Marai

66. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

Mr. D.P. Hansda

67. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

Mr. H.K. Tripathy

68. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

Ms. Sunanda Garabadu

69. Attended the 6th International Symposium on Vector and Vector Borne Diseases held at Hotel Swosti Plaza, Bhubaneswar from 9th to 11th February 2002.

6.4 Training and Workshop attended:

Dr S.K.Kar

1. Attended a National Workshop on "Strategy for Social Mobilization and Communications to eliminate Lymphatic Filariasis" at Administrative Staff College of India, Hyderabad, Andhra Pradesh on 21-25th May, 2001.
2. Attended Regional Brainstorming Workshop for Developing Bhubaneswar as a Healthy City conducted by National Institute of Urban Affairs, Ministry of Urban Affairs, Delhi on 6-7th August, 2001 at *Pantha Nivas*, Bhubaneswar and delivered a talk on "Endemic and Epidemic Diseases in Bhubaneswar".
3. Attended a Workshop on "Observance of Annual Mass Drug (DEC) Administration (MDA) to Community" in RMRC,Bhubaneswar organised by NAMP, Delhi on 17-18th August, 2001.
4. Participated in Workshop entitled "Orissa NFHS-2: Findings Dissemination" at Swosti Plaza on 22nd September, 2001, organised by State Health Department and UNICEF.
5. Attended a Workshop as invited speaker on "Leprosy" organised by LEPRA India in collaboration with Govt. of Orissa on 10-11th December 2001, and delivered talk on "Current Perspective of Leprosy".
6. Attended "Review Group meeting of ICMR/GOI/WHO collaboration project on Development of Capacity Building for health care among primitive Tribes held at RMRC, Bhubaneswar from 17th – 19th January 2002.

Dr. M.K.Das:

7. Attended the ICMR–Ellision foundation sponsored workshop on Immunoparasitology held at Bhubaneswar from 11th to 15th February 2002.

Dr. B. Ravindran:

8. Organised the ICMR–Ellision foundation sponsored workshop on Immunoparasitology held at Bhubaneswar from 11th to 15th February 2002.

Dr. G.P. Chhotray:

Attended the ICMR–Ellision foundation sponsored workshop on Immunoparasitology held at Bhubaneswar from 11th to 15th February 2002.

Dr. S.S.S. Mohapatra.

9. Attended the workshop on "National Burden of Disease Studies" held at Institute of Health Systems, Hyderabad from 10 – 22 Decembor'2001.

Dr. A. Mohapatra:

10. Participated in ICMR-WHO Workshop on "Use of Information Technology in Biomedical Research" held during 5-7th September 2001, NICED, Kolkata.
11. Attended "Review Group meeting of ICMR/GOI/WHO collaboration project on Development of Capacity Building for health care among primitive Tribes held at RMRC, Bhubaneswar from 17th – 19th January 2002.

Dr. A. K. Satapathy

12. Attended the ICMR-Ellison Foundation Workshop on Immunoparasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Mr. P.K. Jangid

13. Attended ICMR-WHO workshop on "Use of Information Technology in Biomedical Research at NICED, Kolkatta on 5 - 7 September 2001.

Mr. A.S. Acharya

14. Attended the workshop on National Burden of Disease studies held at Institute of Health Systems, Hyderabad from 10 – 22 December'2001.
15. Attended "Review Group meeting of ICMR/GOI/WHO collaboration project on Development of Capacity Building for health care among primitive Tribes" held at RMRC, Bhubaneswar from 17th – 19th January 2002.

Mr. N.N. Mandal

16. Attended the ICMR-Ellison Foundation Workshop on Immunoparasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Dr. P. K. Sahoo

17. Attended the Training Workshop on "Laboratory diagnosis of Leptospirosis" organized by Regional Medical Research Centre, Port Blair, Andaman and Nicobar Island from 22nd to 28th August 2001.

18. Attended "Review Group meeting of ICMR/GOI/WHO collaboration project on Development of Capacity Building for health care among primitive Tribes held at RMRC, Bhubaneswar from 17th – 19th January 2002.

19. Attended the ICMR-Ellison Foundation Workshop on Immunoparasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Dr. M.C. Mohanty

20. Attended the ICMR-Ellison Foundation Workshop on Immuno-parasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Dr. M.S. Bal

21. Attended the ICMR-Ellison Foundation Workshop on Immuno-parasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

Mr. H.K.Khuntia

22. Attended the workshop on "Monitoring of multiply antibiotic resistance among clinical strains of enteropathogens at NICED, Calcutta 14 – 17th May, 2001.

Dr. G. Bulliyya

23. Attended a "Workshop on Research Methodologies for Micronutrients" held at Ranikhet (Uttaranchal) from 22-24 March 2002 and presented a paper on 'Current scenario of mircronutrients deficiency in Orissa'.

Dr. B. Sahoo

24. Participated in ICMR-WHO Workshop on "Use of Information Technology in Biomedical Research" held during 5-7th September 2001, NICED, Kolkata.

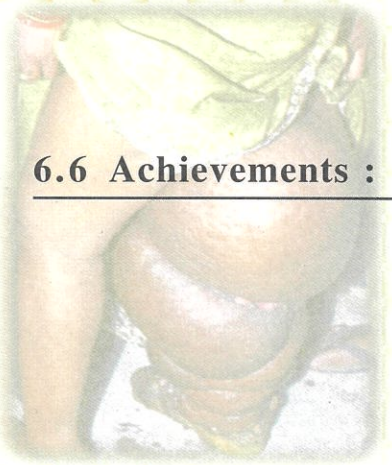
25. Attended ICMR-NIC workshop on "Effective Management of Library and Information Resources in Cyber-age" being organized by NIC, Hyderabad from January 15-19, 2002.

Mr. B. R. Sahu

26. Attended the ICMR-Ellison Foundation Workshop on Immunoparasitology organized by RMRC, Bhubaneswar from 11th to 15th February 2002.

6.5 Human Resource Development:

1. Dr. M. C. Mohanty was awarded Ph.D. degree from Utkal University for the thesis entitled, "A study on the protective immune response in Filariasis" under the guidance of Dr. B. Ravindran .
2. Sri H.K.Tripathy attended the course on 'Post Graduate Diploma in Medical Entomology' at Vector Control Research Centre, Pondicherry under Pondicherry University from September 2000 to June 2001.
3. Training on rearing mosquitoes and parasite identification in blood smear given to post doctoral fellows of Utkal University, Institute of Life Science and Regional Plant Resource Centre, Bhubaneswar and Berhampur University, Berhampur.
4. Mr. H.K. Khuntia is persuing his Ph.D. on the topic "Molecular epidemiological analysis of *V.cholerae* associated with endemic and epidemic cholera in coastal and tribal districts of Orissa" under the guidance of Dr. G.P.Chhotray and Dr. T. Ramamurthy AD, NICED, Kolkatta.
5. Dr. M. C. Mohanty was selected for DBT-sponsored Post Doctoral Fellowship and joined as Research Associate at NII, New Delhi in February 2002.
6. Ms. Aliva Mahunta, M.Sc. Student of Microbiology,OUAT, Bhubaneswar did her M.Sc. dissertation on "Studies on Cyropreservation of Parasites" under the guidance of Dr. B. Ravindran.
7. Ms.Smaranika Mohapatra, a Post Graduate student of O.U.A.T., Bhubaneswar did her M.Sc. dissertaion on "Studies on Rotavirus as an aetiological agent in acute diarrhoeal illness amongst hospitalized children of paediatric age group in and around Bhubaneswar, Orissa" under the guidance of Dr. G.P.Chhotray.
8. A short course of training in "Diagnosis of Hemoglobinopathies" was imparted to Dr. Upendra Yadav, Asst. Professor of Pathology, M.G.M. Medical College, Jamshedpur and Mr.P.K.Padhy, Lab. Technician attached to Asst. District Medical Officer, Bhawanipatna (Kalahandi Dist., Orissa) from 21st to 25th January 2002, Bhubaneswar under guidance of Dr. R.S. Balgir.
   Ms. Kalyani Sahoo of Department of Microbiology, O.U.A.T., Bhubaneswar did her M.Sc. dissertation on "Serosurveillance of human toxoplasmosis in Orissa: A hospital based study" under the guidance of Dr. M.R. Ranjit .



6.6 Achievements :

1. Dr.R.S.Balgir was honoured with a Memento for Research Contributions by the General President, 89th Indian Science Congress held during 3-7th January 2002, Lucknow. Dr.Balgir was appointed as one of the Judges for Poster Presentations in Anthropology and Archeology Section.
2. Dr. R.S.Balgir served as External Examiner for conducting Practical Examination of M.Sc.(Final) students, Department of Human Genetics, Andhra University, Vishakhapatnam on 24th April, 2001.

3. Dr. R.S.Balgir was elected as a Member of Sectional Committee of Anthropological & Behavioural Sciences for 90th Session of the Indian Science Congress Association (ISCA) for the year 2002-2003.

4. Dr. Madhu Chhanda Mohanty received best poster presentation award in the 6th International Symposium on vector and vector borne diseases organized by National Academy of Vector Borne Diseases and Regional Medical Research Centre, Bhubaneswar from 9th – 11th February 2002 at hotel Swosti Plaza, Bhubaneswar.

6.7 Conferences / Workshops organized:

(a) National Conference of "The Indian Society of Hematology & Transfusion Medicine"

S.C.B. Medical College, in collaboration with RMRC organized 42nd Annual National Conference of the Indian Society of Hematology & Transfusion Medicine during 23-25th November 2001, at Swosti Plaza, Bhubaneswar.

(b) Review Group meeting of ICMR/GOI/WHO collaboration project on Development of Capacity Building for health care among primitive Tribes held at RMRC, Bhubaneswar from 17th – 19th January 2002.

(c) International Symposium on "Vector and Vector Borne Diseases"

6th International Symposium on vector and vector borne diseases was organized by National Academy of Vector Borne Diseases and Regional Medical Research Centre, Bhubaneswar of Hotel Swosti Plaza, Bhubaneswar from 9th – 11th February 2002.

(d) ICMR – Ellison Foundation Workshop on "Immunoparasitology"

An international workshop on Immunoparasitology was conducted by RMRC, Bhubaneswar from 11th to 15th February 2002. The workshop was funded by ICMR and the Ellison foundation in USA.

(e) Symposium on HIV/AIDS:

A Symposium on HIV/AIDS was organized at this Centre on 8th February, 2002. Experts in the field and local bodies, State AIDS Cell, Medical College Experts, and other local experts participated in the same. Dr. S. P. Tripathy, Ex-Director General, ICMR, Dr. S.Pattanayak , Ex-consultant WHO & Chairman, ICMR Task Force delivered the guest lecturers and reviewed current strategy & future needs of research in this area.

6.8 Scientific Facilities:

Laboratory animals in Animal house of RMRC

i) **Animal House:**

The small animal facility in the Centre continues to be used for all relevant on-going projects. A new animal house building at a cost of about 76.00 lakhs is under process of construction shortly by CPWD for which the first instalment of Rs.20.00 lakhs has already been deposited to with CPWD.

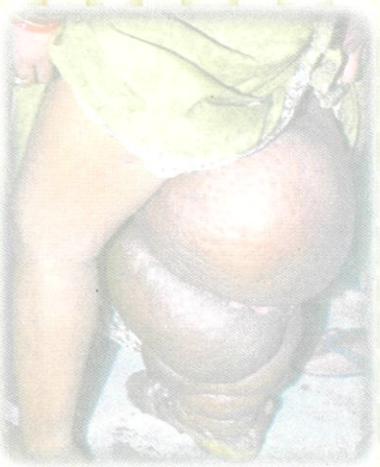
ii) **Insectarium:**

The insectarium in the Medical Entomology Division continues to be used for colonizing *Anopheles stephensi, Aedes aegypti* and *Culex quinquefasciatus* which are widely used in several on-going projects. Training on rearing and parasite identification in the blood smear and as well as in mosquito are given to post doctoral fellows of University, ILS and RPRC, Bhubaneswar.

6.9 Library and Information Facilities:

Regional Medical Research Centre, Bhubaneswar provides both library and Information services to the scientists and researchers, doctors and academicians. For the calendar year 2002 the library subscribes 34 foreign journals and 42 Indian journals for scientists and researchers. Besides, 7 daily Newspapers and 3 magazines are also subscribed. The library caters library, Information and reprographic support to its users. The following are the facilities available at RMRC library.

- **On-line reprint request:** On-line reprint requests are being done for the scientists and researchers through Internet.
- **Resource Sharing in ICMR Libraries:** All ICMR librarians have formulated an ICMR Librarians group mail (icmrlibrarians@yahoogroups.com) for resource sharing. Any article available in any ICMR library can be obtained and delivered to scientists through this group mail service.
- **Photocopying services:** Photocopy facility is available for scientists and researchers of ICMR free of cost. For Non - ICMR library user Rs. 0.75 paisa per page has to be deposited for photocopy charge.
- **Off- Line database search:** Library possesses MEDLINE-CD ROM database from the period 1966-2001. This facility is extended to all library users as off-line MEDLINE services.
- **INTERNET & E-Mail services:** Internet facility is available to all ICMR scientists for searching various on-line databases like http://www.ncbi.nl..nih.gov, http://www.inmed.nic.in etc. and also for full text articles available in the net through http://www.freemedicaljournals.com for free full text journals.
- **Inter-Library Loan :** RMRC Library provides inter-library loan services to the Institute scientists in collaboration with the librarians of the research organisations and medical college situated in the twin city Cuttack- Bhubaneswar. The



participating libraries are Regional Research Laboratory, Institute of Physics, Institute of Life Sciences,Central Institute of Fresh Water and Aquaculture (CIFA), and SCB Medical College , Cuttack .

- **News Clippings:** RMRC library does news clipping work on regional and state health problems appearing from time to time in local daily newspapers.
- **Scientific Publications:** RMRC library maintains scientific publications of the institute scientists and updates regularly for sending it to council for scientometric analysis.
- **RMRC Web Site:** The Regional Medical Research Centre, Bhubaneswar has registered for its Web- site (http://www.rmrcicmr.org) and the site is going to be launched shortly.
- **RMRC News Bulletin:**

  The Regional Medical Research Centre, Bhubaneswar has published its first half yearly News Bulletin.

- **Publication of Educative materials on Diseases:**

  Write-ups in form of pamphlets and booklets on diseases like Filariasis, Malaria and Iodine deficiency disorders are prepared for publication as educative material for demonstration and exhibition to public.

6.10 Budget and Extramural grants:

The total sanctioned Budget in respect of the Centre (Non-Plan & Plan) for the year 2001-2002 is as follows:

(Rs. in lakhs)

1.	Pay & Allowance	135.36
2.	Pension	0.70
3.	T.A.	4.99
4.	Other Charges	60.70
5.	Equipment	36.32
6.	Capital	115.00
	TOTAL	**353.07**

The total expenditure made by the centre for the year 2001-2002 is Rs.351.73 lakhs.

The total sanctioned budget in respect of the centre (Non-Plan) for the year 2000-01 is as follows:

(Rs. in lakhs)

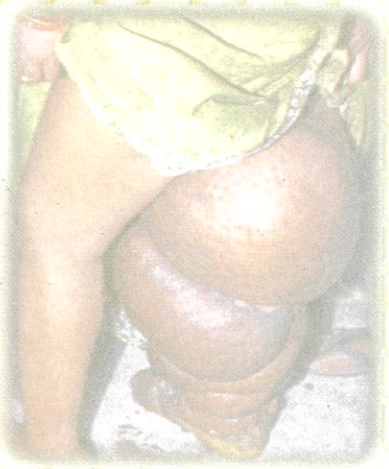
1.	Pay & Allowance	114.16
2.	Pension	0.65
3.	T.A.	6.75
4.	O.C.	56.39
5.	Equipment	57.65
6.	Capital	11.04
	TOTAL	246.64

The total expenditure made by the centre for the year 2000-2001 is Rs.245.39 lakhs.

Projects (Extramural)

Total eleven numbers of Extramural Projects are running under Regional Medical Research Centre, Bhubaneswar. Total Budget sanctioned for the year 2001-2002 of the extramural Projects is Rs.93.69 lakhs.

6.11 Members of the 16th Scientific Advisory Committee:



1. **Dr.D.S. Agarwal** — Chairman
   B-24, Swasthya Vihar,
   Delhi 110 092
2. **Dr S. Pattnayak** — Member
   B-91, Swasthya Vihar,
   Delhi 110 092
3. **Dr.R.C. Mahajan** — Member
   House No:276, Sector-6,
   Panchkula, Chandigarh
4. **Dr Bimal C. Kar** — Member
   (Retd. Prof. of Medicine,
   V.S.S.Medical College)
   Medical Aid and Research Centre,
   BURLA 768 017, Sambalpur, Orissa.
5. **Dr Sarita Agarwal** — Member
   Addl. Professor
   Deptt. of Genetics, S.G.P.I.M.S.,
   Raebareli Road, Lucknow 226 014
6. **Dr S.P.Mukhopadhyay** — Member
   Prof. & Head
   Health Care and Hospital Management
   Deptt. of PSM
   Indian Institute of Social Welfare and
   Business Management
   Management House
   College Squire (W), Kolkata 700 073
7. **Dr Arvind Pandey** — Member
   Director
   Institute for Research in
   Medical Statistics, Ansari Nagar
   New Delhi 110 029
8. **Dr Sandeep Basu** — Member
   Director
   National Institute of Immunology
   Aruna Asaf Ali Marg
   New Delhi - 110067

9. **Director** — Member
   Health Services
   Directorate of Health Services
   Heads of the Dept. Building
   Bhubaneswar 751 001

10. **Director,** — Member
    Natrional Anti Malaria Programme
    22, Sham Nath Marg
    Delhi 110 054

11. **Dr G.C.Mishra,** — DG's nominee
    Director
    National Center for Cell Sciences
    MCCS Complex, Gaurhind
    Pune 411 007

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

6.12 Human Ethical Committee:

1. **Justice (Mrs.) A.K.Padhi** — Chairman
   Former Judge, Orissa High Court
   10, Bhasakosh Lane
   Nimchouri, Cuttack-753 002
2. **Prof. B.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** — Member
   C/o.Prof. G.C.Das
   Santiniketana, Mathasahi, Cuttack
6. **Dr.P.K.Acharya** — Member
   Chief Medical Officer
   Capital Hospital
   Bhubaneswar-751 001
7. **Father Tony** — Member
   Principal
   Loyala School, Chandrasekharpur
   Bhubaneswar-751 023
8. **Dr.S.K.Kar** — Member-Secretary
   Director, RMRC
   Bhubaneswar

6.13 Animal Ethical Committee:

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

REGIONAL MEDICAL RESEARCH CENTRE

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