Annual Report

(April 2000 to March 2001)

REGIONAL MEDICAL RESEARCH CENTRE

(Indian Council of Medical Research)

BHUBANESWAR-751 023

ORISSA, INDIA

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REGIONAL MEDICAL RESEARCH CENTRE

(Indian Council of Medical Research)

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have an excellent record of publications in various national and international journals. Apart from research, the staff spend considerable time in attending meetings, conferences and looking into committee activities. An OPD facility for Filariasis treatment and care was recently established at the Capital hospital, Bhubaneswar .The facilities like insectorium, animal house, central equipment laboratory are being upgraded. The development of computer network systems are planned to augment the Center's activities.

During the year 2000-2001 the council has provided an annual budget of around 245.39 crores. An additional 1 crore was generated as extramural project grants from other sources. The funds received from the council are mostly used for staff salaries, establishment, research and developmental activities of the center. As a part of the staff welfare activities the construction of new quarters has been undertaken. A new animal house is being built. For the upkeep of staff quarters and the office buildings one time repair activities are being executed. As per the center's requirements an auditorium, a guest house and a hostel for trainees are being constructed.

More than 30 research projects including 12 extramural projects are being run by the center. A total of 27 research papers were published in scientific journals. The center organises regular journal clubs and weekly seminars among the scientists as well as encourages participation of experts of repute from outside. The center teamed up with the SCB Medical college, Cuttack to jointly organise a national conference in the year 2001.

The center has been providing consultancy services to the state for diagnostic and management areas in filariasis. Regular diagnostic services are being rendered in haemoglobinopathy disorders referred from medical colleges and hospitals of Orissa. During calamities like floods and cyclones diagnostic services are provided for diseases like diarrhoreal disorders, cholera, leptospirosis and malaria.

Training to MSc students of various universities are being imparted for their dissertation work. Besides, the center runs a regular PhD program for students. Training courses for technicians and paramedical workers in the field of malaria to the state government officials have been planned. Library facilities are being continuously updated. Medline facilities have been provided .The website of the institute is being developed and will be put on the net.

The center continues its linkages with the state health department and various national and international agencies. The center has teamed up with JICA for developmental activities in the field of filariasis. Linkages in the form of funding for its scientific projects have been developed. The center receives funds from European community (EC), WHO(TDR), ICMR task force and MOHFW. The center has established its linkages and technical support from NIN ,NICED,

VCRC,MRC and NIE as well as IIH.

The scientists have made continuous efforts and contributed significantly to the output of the center. I sincerely thank the staff for their valuable contribution. I am also extremely thankful to the State health department and other local agencies for their cooperation .I would like to express my gratitude to the council which has not only rendered its financial and administrative support continuously, but has also provided guidance and encouragement to the center. With all round support the center will continue its endeavor to achieve its goals.

S.K Kar.
Director.

REGIONAL MEDICAL RESEARCH CENTRE BHUBANESWAR

Highlights of Achievements (2000-2001)

The Centre has been pioneering its efforts towards understanding human filariasis and biology of filarial parasites in the context of structure and functions of their components. During the year 2000 significant progress was made in characterizing the biological function of a purified filarial antigen DssD1 which is expressed on the sheath of microfilaria. Antibody response to this component was found to be very high only in subjects currently free of active filarial infection. Cloning and sequencing the genes that code for this sheath protein will be undertaken shortly. The study is expected to reveal the structure of this crucial protective antigen in human filariasis. The observation of inverse association found between anti-Mf sheath antibodies and circulating filarial antigens and failure to induce such antibodies in Mf carriers after loss of circulating Mf have offered insights into the natural history of human lymphatic filariasis. Contrary to contemporary thinking that development of pathology is necessarily followed only after patent phase of infection, findings made in the center have indicated that patent infection and development of disease could be two different, if not mutually exclusive consequences of exposure to filarial infection in endemic areas. Longitudinal follow-up of Mf carriers and endemic normals and prevalence of vector population in areas endemic for Brugian and Bancroftian filariasis also support such an interesting consequence in human filariasis. The observation that filarial specific IgA could be the effector molecule of protective immunity in human filariasis has practical utility in identification of potential protective filarial antigens using recombinant DNA technology. Future studies on filariasis in the center will focus on addressing such issues. Studies in human *P.falciparum* malaria have revealed the protective nature of autoantibodies in malaria and the role of inflammatory Th1 polarized immune responses in mediating cerebral malaria. Studies on the prevalence of G6PD deficiency, sickle cell anaemia and thalassaemia amongst various tribes of Orissa have shown significant differences between different primitive tribes where intervention strategy are planned. The Centre has currently taken studies on intervention programme against intestinal parasitism, scabies, cholera, malaria, Vitamin deficiency, nutritional anaemia and capacity building in health care delivery amongst primitive tribes of Orissa. Nutritional studies amongst primitive tribes revealed that anaemia is predominant amongst elderly and deficiency of intake of diet as per requirement. The related factors are evaluated to help planning future intervention strategy.

STAFF POSITION AS ON 31.03.2001

DIRECTOR

DR. S. K. KAR, M.D.

IMMUNOLOGY DIVISION

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

MEDICAL ENTOMOLOGY DIVISION

Dr. A. P. Dash, M.Sc., Ph.D., D.Sc.	Deputy Director (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. Banamali Nayak	Field 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, B.A., Dip.MLT, 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. K. C. Jena	Laboratory Attendant
Mr. C. R. Samantray	Lab. Assistant

HUMAN GENETICS DIVISION

Dr. R. S. Balgir, M.Sc. (Hons.), Ph.D.	Deputy Director
Mr. B. Murmu, M.Sc., M.Phil.	Research Assistant
Mr. T. Moharana	Lab. Assistant
Mr. N. N. Pattnaik	Laboratory 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	Senior Research Officer
Dr. A. Mohapatra, M.Sc., M.Phil., Ph.D.	Senior Research Officer
Dr. G. Bulliyya, M.Sc., Ph.D.	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
Mrs. G. Mallik, M.Sc.	Research Assistant
Mr. S. C. Rout	Lab. Technician
Mr. Kalpataru Dhal, B.A.	Census Taker
Mr. R. N. Nayak, B.A.	Census Taker
Mr. H. K. Jena	Field Attendant
Mr. R. K. Hembram	Field Attendant

JUNIOR RESEARCH FELLOWS

Mr. B. R. Sahoo, M.Sc., M.Phil.	Junior Research Fellow
Mr. A. N. Nayak, M.Sc., M.Phil.	Junior 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. B. Sutar, M.Com.	Assistant
Mr. R. C. Muduli, B.A.	Assistant
Mr. Abani K. Nayak, B.Com.	Personal Assistant
Mrs. R. Varghese	Steno
Mr. A. P. Parida, B.A.	U.D.C.
Mr. B. S. Rao	U.D.C.
Mr. S. Nayak	L.D.C.
Mr. S. K. Majhi, M.A., LL.B.	L.D.C.

Directors' Office

Mr. L. S. Rao, B.A.	Private Secretary
Mr. P. C. Nayak, B.A.	Personal Assistant

ACCOUNTS

Mr. R. V. Rao, B.Com.	Accounts Officer
Mr. S. K. Satapathy	U.D.C.
Mr. R. Rath	U.D.C.
Mr. S. K. Das, B.Com.	L.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. S. C. Das	Laboratory Attendant
Mr. S. K. Mallick	Laboratory Attendant

INSECTORIUM

Mr. K. C. Parichha	Insect Collector
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

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. J. Naik	Sweeper-c-Attendant
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.

CONTENTS

Prof. T.V. Rajan, University of Connecticut, USA giving a seminar on "Immunology of Filariasis".

Prof. Utpal Sengupta, Director, CJIL, Agra presenting a seminar on "Immunology of Leprosy".

Dr. R.K. Shenoy addressing
scientists and clinicians of SCB Medical College on
"Clinical Management of Filariasis".

Prof. B.C. Harinath giving a seminar on
"Immuno diagnosis of Filariasis".

ONGOING PROJECTS

1.Filariasis

1.1.1 Immune response to parasite lipids in human filariasis.

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

Starting date: 1995; Closing date: December 2001.

Background information and progress:

This center earlier demonstrated (Annual Report 2000) the presence of increased antibodies to filarial lipid antigens in microfilariae negative sera of endemic individuals. The antigen was also shown to be glycolipid in nature, carohydrate moieties being immunodominant. Six individual lipid fractions were isolated from the total lipid mixture of adult *Setaria*.

I. It was found that only one fraction exhibited high antibody levels in endemic normals (n=30) compared to sera collected from other clinical categories. Attempts are being made to determine the IgG subclass levels to this fraction in the sera.

II. Antiserum to filarial lipids is being raised in rabbits to determine the localization of these antigens in filarial parasites (MF of *W.bancrofti*)

III. Parallal data on anti-protein and lipid reactivity of filarial sera are being obtained to directly compare the immune response to protein or lipid antigens.

1.1.2 Antigenecity of filarial enzymes in endemic population.

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

Starting date : 1993; Closing date : December 2001

Background information and progress:

This center earlier characterized important filarial enzymes namely Glutathione –S

trasferase, Superoxide dismutase and proteases and demonstrated the antigenic properties of these enzymes in human filarial infection. Specific antibodies to these enzymes were observed in the sera of people infected with *W. bancrofti*. IgG4 antibodies to a protease (SdpI) were noted in the filarial sera. Since antigenemia as well as IgG4 response are known to be marker of active infection, these two parameters were measured in individual filarial sera.

I All the microfilaraemics (n=23) are seropositive for IgG4 and Og4C3 antigen.

I. Generally antigen positive sera (n=53) were also found to be SdpI -IgG4 positive.

II. IgG4 antibodies was found in higher numbers of individuals (n=73) than those of antigenemia and microfilaraemia.

III. None of non-endemic (n=25) sera was seropositive for SdpI- IgG4.

1.1.3 Immunological characterization of filarial antigen with potential protective response in endemic population (DBT funded).

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

Starting date : December 2001; Duration: 3 Years

Aims and objectives:

1. Immunochemical characterization of $Dssd_1$, and lipid antigens with potential for microfilariae clearance from infected animals.
2. Studies on antibody response to these antigens in "endemic normals" vis-a-vis infected population.
3. Studies on cytokine profiles induced by the specific antigens in order to understand the immunoregulatory mechanisms.

Background information and progress:

The objective of this project is to utilize two diverse filarial antigens – one protein (DssdI) and the other lipid, which were detected in this Centre earlier, in studying the immunological responses especially for endemic normal individuals living in *W. bancrofti* endemic region. It is necessary to characterize the 'endemic normal individuals carefully since this group could be a heterogenous mixture of individuals who might carry cryptic/

prepatent infection with low level microfilaraemia and individuals who may be truly immune.

I. Two groups of individuals which had remained normal for 10 years (n=17) and 6 years (n=37) periods were identified. Antibody levels to Dssdl were analysed in these individuals.

II. Another group of people (n=25) who have antigenemia but otherwise free from microfilariae and disease, are also identified.

III. The possible conversion of endemic normals into other filarial groups or into prepatent (Ag+ but otherwise normal) group was followed. Immunological parameters of the above antigens with the normal/disease status is being investigated.

1.1.4 Studies on protective immune response in experimental filariasis.

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

Collaborators: Dr. Satyajit Rath and Dr. Vineeta Bal from National Institute of Immunology, New Delhi.

Stating date : March 1998; Closing date: August 2002

Aims and objectives:

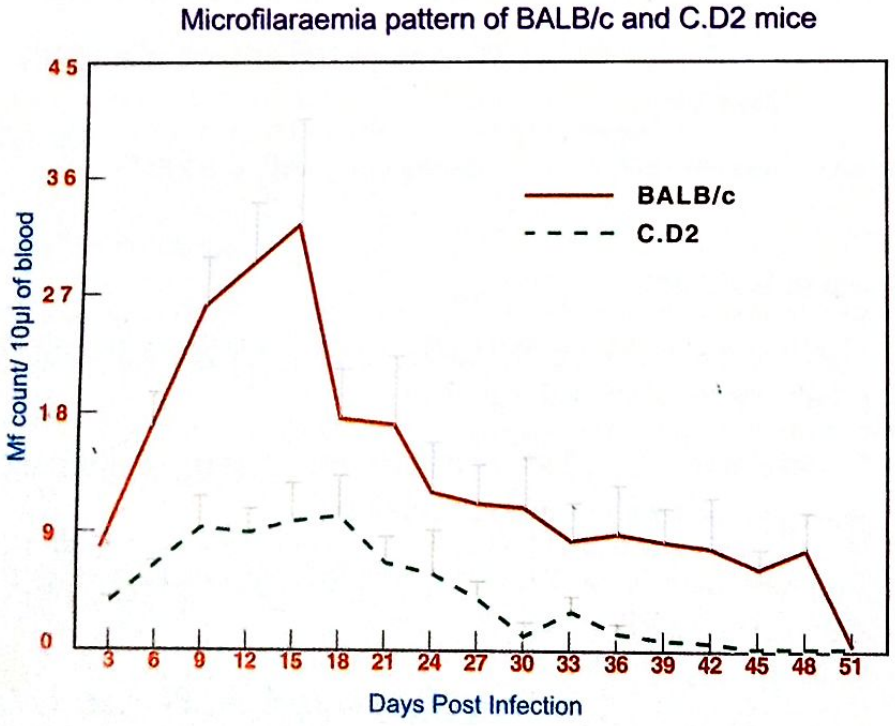
1. To study protective immune responses in experimental filariasis by using genetically modified strains of mice.
2. To understand the effector mechanisms involved in elimination of different developmental stages of filarial parasites.
3. To study the role of different cytokines in regulation of microfilaraemia in experimental mice.

Progress:

The nature of protective immunity against larval as well as microfilarial stages were addressed using XID-mice which were found to be highly susceptible to filarial infection. As reported in the annual report 1999-2000, studies were undertaken to characterize the immune response phenotype in XID as well as its wild type counterpart. It was concluded that macrophages of XID mice are significantly deficient in up-regulating

inducible nitric-oxide synthase (inos) and that they are prone to a highly skewed Th1 type of immune response. These observations have indicated in the need to take a radically different perspective of host susceptibility to filarial infection and has resulted in the proposal "Filariasis: Are inflammation and immunological hyper-reactivity needed for parasite developments" published in Trends in Parasitology, recently.

To further confirm the above proposal, mice deficient in IFN - γ (IFN - γ gene knock-out mice) were tested for microfilarial clearance along with matched wild type controls. The results indicate that the mf clearance is not dependent on the host's ability to produce IFN - γ . Since XID-mice were found to be highly susceptible and were deficient in nitric oxide production with a high Th1 bias, the issue was addressed using Balb/C and C.D2 mice. The macrophages of C.D2 mice demonstrate a normal nitric oxide production comparable to Balb/C but are prone to a skewed Th1 response. The results shown in **Fig – 1** indicate significant differences in microfilaraemia clearance between the two



Microfilaraemia clearance in C.D2 and Balb/C mice. Animals were injected intraperitonially with 1 x 10^6 Mf of S.digitata in C.D2 and Balb/C mice (n=10 for each). Mean ±SE of Mf/10µl are shown.

Fig. 1

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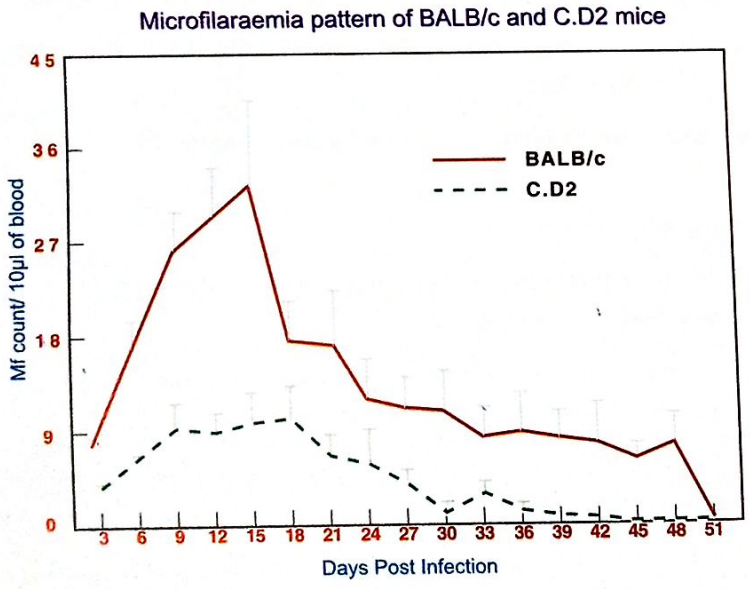

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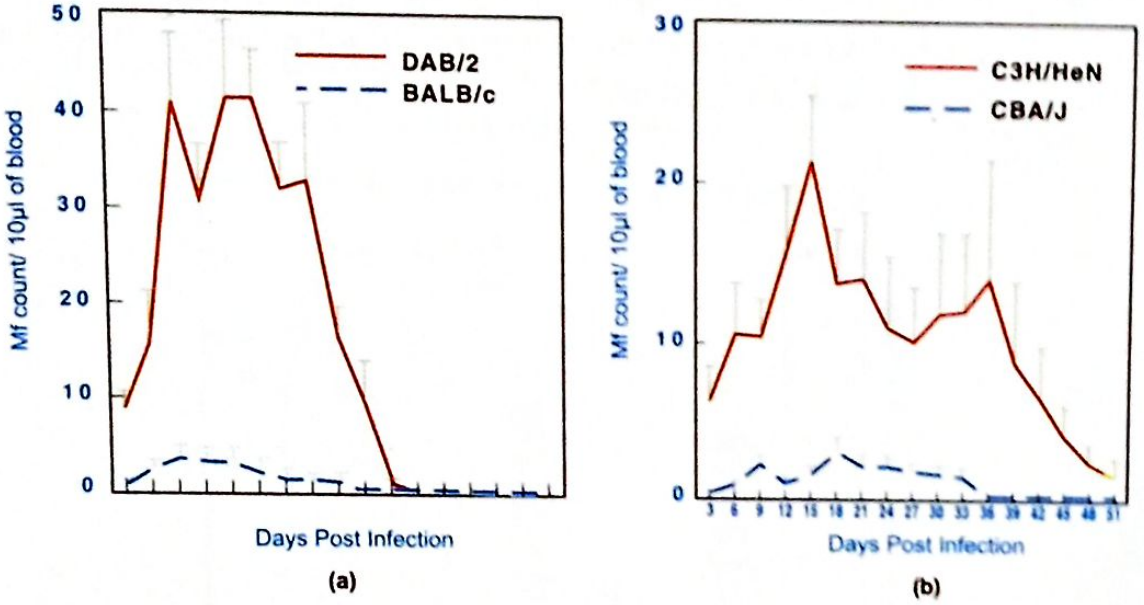
Fig. 1

strains indicating thereby that Th1 bias is crucial for parasite persistence and that macrophage released extra-cellular nitric oxide could not be primarily instrumental in mf clearance.

As a prelude to address the role of non-MHC associated factors contributing to filarial susceptibility the following four strains of mice were tested for mf clearance: a) Balb/C b) DBA/2 c) C3H/HeN d) CBA/J. The results shown in **Fig – 2a and 2b** indicates that strain differences rather than MHC-background contribute to differential susceptibility of mice



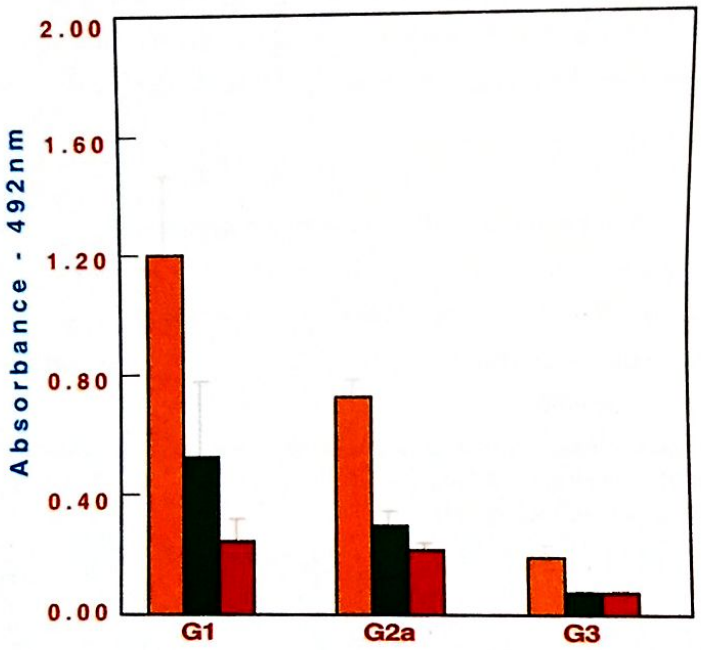
Microfilaraemia clearance in wild type animals: Animals were injected intraperitonially with 5 x 10^5 Mf of *S. digitata* in DBA/2 (n=7), Balb/C (n=12, C3H/HeN (n=7), CBA/J (n=13) mice; Mean ± SD of Mf/10µl are shown.

Fig. 2

to clearance. Balb/C was resistant to microfilarimia while DBA/2 were highly susceptible although both the strains are of H-2d MHC haptotyps. Similarly CBA/J were highly susceptibility in comparison to C3H/HeN mice while the strains belongs to H-2k haptotype.

It has been previously reported that an intraperitonial infection of live Mf primarily induces IFN - γ driven Th-1 induction with the production of Mf-specific antibody of the isotypes IgG1, IgG2a, IgG3 and IgM and also that 21 days post Mf infection there was a rise in the Th-2 cytokines. As Mf survives for several days in Balb/C mice, the change in Th-response could be due to the dead/dying nematodes. To investigate whether dead Mf can elicit a qualitatively different response from live Mf to Fil.Cho and Fil.Pro the immune responses of XID mice inoculated with live parasites were compared with those inoculated with killed parasites.

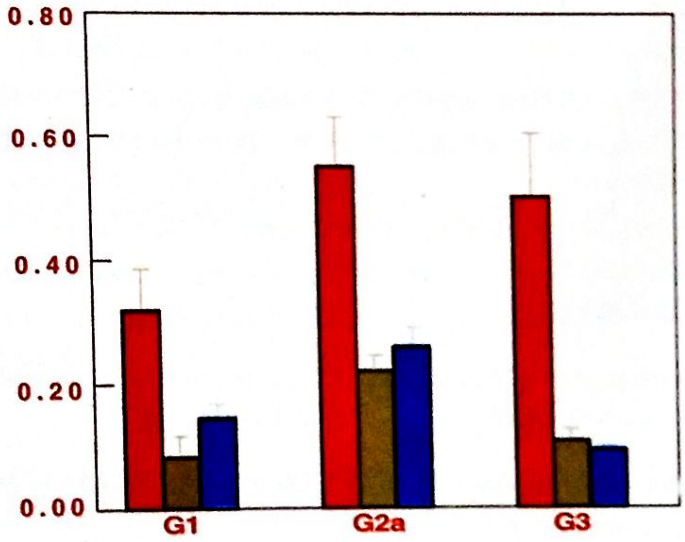
Both live and killed Mf induced Fil.Nat specific IgG1, IgG2a responses by 37th days post infection (**Fig - 3**). However no IgG3 response could be detected in animals infected with killed Mf. Live parasites were more efficient at inducing all classes of IgG antibody and live Mf induced IgG1 response was significantly higher than IgG2a and IgG3 response (IgG1>IgG2a>IgG3) at 37th day post infection. A significant difference between IgG2a and IgG3 antibodies to live mf could also be detected. There was a qualitative similarity of antibody isotype profiles between groups of mice infected with live and killed mf. Killed Mf also induced higher IgG1 response than IgG2a. and no IgG3 antibodies. However there was a very significant difference between the IgG1 and IgG2a antibody response of live and dead parasites.



Mf specific immunoglobulin responses to Fiul. Nat in XID mice infected i.p with 10^5 live or freeze killed Mf (n=4). Sera were taken at 37th day p.i. from control mice (hatched bars), mice infected with killed Mf (crossed bars) and mice infected with live Mf (closed bars). Immunoglobulin levels were measured by ELISA using plates coated with Fil. Nat. Results are expressed as Mean absorbance ± SEM Live Mf : G1 vs G2a, $p<0.05$; G2a vs G3, $p<0.001$; G1 vs G3, $p<0.001$; killed Mf : G2a vs G3, $p<0.05$; G1, live Mf vs killed Mf, $p<0.01$; G2a, live Mf vs killed Mf, $p<0.05$.

Fig. 3

Fil. Pro. specific antibody isotype response in both the groups of mice followed the same pattern as observed to Fil.Nat (IgG1> IgG2a>IgG3). IgG1 antibody response was significantly higher than IgG2a & IgG3 antibody response in mice infected with live parasites. Mice infected with dead Mf could only induce Fil.Pro specific IgG1 response while no Fil.Pro specific IgG2a or IgG3 response could be detected in this group. However very significant differences were observed in the isotype profile in the groups of mice when tested for antibodies to Fil.Cho. Fil.Cho specific IgG2a and IgG3 antibodies response were comparatively higher than the IgG1 response. Furthermore unlike the response to Fil.Nat and Fil.Pro, IgG2a antibody response was significantly higher than the IgG1 antibody response when tested against Fil.Cho. **Fig – 4.** There was no significant induction of Fil.Cho specific antibodies in the group of mice infected with dead parasites.



Mf specific immunoglobulin responses to filarial carbohydrates (Fil. Cho) in XID mice infected i.p with 10^5 live or freeze killed Mf (n=4). Sera were taken at 37th day p.i from control mice (hatched bars), mice infected with killed Mf (crossed bars) and mice infected with live Mf (closed bars). Immunoglobulin levels were measured by ELISA using plates coated with Fil. Cho. Results are expressed as Mean absorbance ± SEM. Live Mf : G1 vs G2a, $p<0.05$, G1, live Mf vs killed Mf, $p<0.01$.

Fig. 4

Further work were carried out to characterize the expression of WGA binding epitopes in filarial parasites. Studies on the factors that govern glycosylation will be crucial for understanding the biological role of such components in natural infection and in induction of immune response by infected hosts to carbohydrate epitopes. The issue was addressed by *in vitro* cultivation of adult stage parasites in the presence of tunicamycin and by exposure of parasites to γ-irradiation prior to *in vitro* culture. Tunicamycin inhibited glycosylation of WGA binding antigen completely while γ-irradiation enhanced the expression of such residues. These observations have revealed the possible mode of action of irradiated parasites (in induction of anti-filarial immunity) which have been successfully demonstrated to induce protective immunity in experimental filariasis by several investigators. Further work is in progress to study the immune response of human subjects living in filarial endemic areas to such protective carbohydrate epitopes.

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

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

Stating date :March 1993; Closing date : August 2002

Aims and objectives:

1. To understand the biological factors associated with growth and development larval and microfilaraial stages of filarial parasites.
2. To study the host responses and that result in elimination of filarial parasites from the infected hosts.
3. 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.*

Progress:

Attempts to develop a laboratory animal model for *W.bancrofti* have been consistently unsuccessful since the factors that govern filarial parasite growth have not been understood. The rational approach has been to delineate such host factors. As reported in the annual report of 1999-2000 the investigations conducted so far have revealed the following 3 features to be crucial for parasite development a) decreased production of inducible nitric oxide synthase (inos) b) deficiency in induction of antibodies to T-independent antigen and c) Th-1 polarized immune response of the host to filarial antigens.

CBA/N or X-linked immunodeficient mice (XID) which has a deficiency to produce antibodies to T-independent antigen (mostly carbohydrates for example PC) and nitric oxide production has been reported as the first animal model to allow development of *B.malayi* larvae to juvenile adult stage. To investigate whether inos inhibition leading to low nitric oxide production could suppress antibody production to filarial specific carbohydrate antigens (PC), an attempt was made to inhibit the immune response of Balb/C mice to PC containing filarial antigen by Aminoguanidine which is an effective inos inhibitor. Groups of Balb/C mice were immunized with 3 dosages of Fil.Nat (50 mg/ animal/dose in 15 days interval) without any adjuvant. Starting from one day prior to immunization the mice were administrated Aminoguanidine in PBS, daily for 15 days. Another group of Balb/C mice were taken as controls for measuring immune response without Aminoguanidine and were immunized with Fil.Nat in a similar manner. Plasma was collected at different time points (0,15,30, 37 days p.i) and the antibody response to PC-BSA was measured by ELISA. The overall antibody response to PC was very high in control group and reached peak levels at 7 days after administration of the last dose of immunogen. In contrast to that animals immunized with Fil.Nat along with daily dose of Aminoguadine elicited significantly decreased antibody response to PC. The results reveal that NO is crucially required for potentiation of antibody responses to T-independant antigens. These findings further demonstrate that decreased NO could facilitate better growth and development of filarial parasites in non-human host. Studies have now been initiated to generate large number of *W.bancrofti* L3. It is proposed to initiate infection of XID-mice with *W.bancrofti* infective larvae in collaboration with Entomology group.

1.1.6 Longitudinal study of lymphatic filariasis in an endemic area of Orissa.

Investigators: Dr. G.P. Chhotray and Dr. M.R. Ranjit

Starting date: January 1999; Duration: 3years

Aims and objectives:

1. To Longitudinally follow up various clinical manifestations of filarial disease in Puri and Khurda districts of Orissa.
2. To study the pathology and pathogenesis of various atypical and occult filarial disease with or without intervention.

Longitudinal follow-up study of filarial endemic population was initiated with baseline population of 2187 (M/F=1155+1032). Of these, only 1379 were studied during first year follow-up. During last year, in 2nd follow-up cohort of 321 individuals from 3 villages of

Satyabadi Block in addition to 1379 individuals who were included in 1st year follow-up were covered, thus making a total of 1700. Parasitological and clinico-pathological profile was surveyed by door to door method and was documented. The follow-up study revealed a remarkable reduction in the Mf rate from 9.2 to 5.8% and disease rate from 33.5 to 23.8%. Further a considerable reduction in the number of cases in asymptomatic microfilaraemia carrier, acute filarial disease(AFD) and chronic filarial disease (CFD) was observed in the follow-up study. Synchronously the number of endemic normals increased from 57.3% to 71.4%. Amongst 99 AMC subjects followed up 85 were found to be positive for *W. bancrofti*, 13 for *B. malayi* and 1 for mixed infections on microscopic examinations of night blood smear as compared to 143, 55 and 3 for *W. bancrofti*, *B. malayi* and mixed infections respectively in the earlier study (Table 1).

Follow-up of clinical progression of lymphoedema in 142 cases out of 184 initially examined was carried out. It was observed that 8.5% of these cases had reversed to normal from initial grades of i.e. Grade I & Grade II. Only 19.1% cases in the Grade I, II and III had progressed to the next higher grade. However 72.3% of the cases did not show any change of grade.

No significant change in the prevalence of TPE, haematuria and arthritis was observed.

Table 1 - Filariometric data of Satyabadi Block

Particulars	Initial	Follow-up		
		1st round	2nd round	Total
Population examined	2187 (1155 + 1032)	1379 (870 + 509)	321 (189+132)	1700 (1059+641)
Endemic normal	1253 (57.3%)	1051	163	1214 (71.4%)
No AMC	201 Wb - 143 Bm - 55 Mixed - 03	57 Wb - 48 Bm - 9 Mixed - 0	42 Wb - 37 Bm - 4 Mixed - 1	99 Wb - 85 Bm - 13 Mixed - 1
No AFD	539	161	76	237
No CFD	194	110	58	168
Mf rate	9.2			5.8
Disease rate	33.5			23.8
Mf D50	Wb - 6.8±1.8 Bm - 3.0±1.1			Wb - 6.3±1.9 Bm - 2.7±1.4

1.1.7 Operational feasibility and efficacy of combination of Albendazole and DEC in controlling lymphatic filariasis. (ICMR Filariasis Task Force Multicentric project).

Investigators: Dr. G.P. Chhotray, Dr. S.S.S. Mohapatra and Dr. M.R. Ranjit.

Starting date: February 2001; Duration of the project: 3 years

Aims and objectives:

1. To compare mass annual single dose DEC alone with co-administration of albendazole and DEC for filariasis control/elimination taking district as a unit.
2. To train local heath authorities (State and district) for implementation, monitoring and evaluation.

The study has two components - (1) Implementation and (2) Evaluation. Before the implementation of drug distribution by state health department, the baseline data in respect to Mf density and carrier rate, disease rate, intestinal geo-helminths and sensitization of the state health authorities are to be undertaken. Ganjam district has 22 P.H.C.s. 50% of them was randomly selected. Night blood survey for microfilaraemia by screening individuals of either sex in the age group of 15-30 years was undertaken. During the period under report a total of 1800 individuals from 35 villages of 5 PHC areas have been examined clinically. Laboratory investigations of night blood smear for Mf and stool for geo-helminthic infection have also been performed. The base line data in selected population of 3 PHCs of Puri district surveyed earlier along with the Ganjam data is shown in Table - 2.

Table 2 : Filariometric & Geohelminthic base line data

Sl. No.	Name of the P.H.C.	No. of Villages	No. Examined	Mf. Prevalence %	Disease Prevalence %	Geohelminth Prevalence %
1.	Keluapalli	7	382	11.3	26.3	10.5
2.	Muncipentha	7	353	10.2	33.1	11.6
3.	Belagaon	8	388	12.6	27.8	9.5
4.	Khandadeuli	6	326	10.4	24.2	10.4
5.	Sumandal	7	351	14.5	36.6	10.5
6.	Satyabadi, Puri	10	1107	9.5	34.6	9.6
7.	Puri Sadar, Puri	5	650	9.2	33.9	7.8
8.	Mangalpur, Puri	7	430	8.4	31.7	9.1

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

Investigators: Dr.S.S.SMohapatra, Dr. A. S. Kerketta, Mr.R.K Das and Mr.P.K.Jangid

Starting date :March 2001; Duration:2 years; Closing date: December 2002

Aims and objectives:

1. To re-assess the earlier defined cohort population of asymptomatic microfilaria carriers (AMC) and endemic normals (EN) for any clinical stage conversion, parasitological and antigen status after a period of 18 and 12 years respectively.
2. To correlate their data on clinical stage conversion with mf and antigen status.

Background:

A cohort of all 163 asymptomatic microfilaria carriers from an endemic village with population of around 3000 identified were followed up longitudinally for clinico-parsitological examination and their immune responses (IgG to ESAg and Ag status) 6 monthly from year 1983 to 1990 and subsequently yearly up to 1994. Endemic normals (224) in various age groups in both sexes selected from filarial endemic villages were also followed up longitudinally on yearly basis from 1987 to 1994. The study was carried out by this Centre to observe the clinical stage conversion perspectively in relation to their parasitological status and immune response to assist understanding the natural progression of lymphatic filariasis. The longitudinal study revealed that microfilaraemia stage was not essential for development of overt clinical filarial disease amongst endemic normals followed up. A small proportion of asymptomatic microfilaraemics did not experience any clinical symptom or sign of disease while mf was no more detectable in them in course of time indicating the prospects of natural protection. However, mostly microfilaraemics had retained the microfilaraemic stage with acquisition of clinical signs that were mild and response to therapy was excellent. However, clinical signs acquired by endemic normals were more severe. Above observations were very pertinent to the understanding of disease process and no such detailed study on longitudinal follow-up is available. Longitudinal follow-up study was presented in 2nd commission of European Community Conference held at Glasssgow in 1994. It is important to re-assess the same cohort to AMC and ENS after a period of 18 years and 12 years respectively with use of currently available more specific diagnostic tool of detection of filarial antigen by ICT/ OG4C3. Hence, the current evaluation study is initiated.

Progress:

Preliminary work of laisioning and re-census of the study population in the already identified villages, namely Patrapada, Bhagabanpur Kumarbasta, Taraboi and Barapada have been completed. The population with AMC (163) and EN (224) who were identified in the baseline year of 1983 are freshly enlisted with their current age and residential status. The clinical evaluation of the current status and collection of blood samples for studying their microfilaraemic and immunological status have been initiated. All the cohort population of AMC and EN available are being assessed by clinical examination, mf status and antigen status (CFA by OG4C3/ICT). Those with AMCs and Ens will be followed up six monthly by clinical examination for assessment of their conversion to different clinical spectrum of filariasis. Concurrently night blood collection and examination will ascertain their micro filaraemic status after filtration by nucleopore following standard procedure. Detection of filariasis specific Ag will be carried out by Immuno-chromatographic Card Test (ICT)/OG4C3 in the study population.

1.1.9 Morbidity control in filarial lymphedema: field clinical trial and treatment seeking behaviour and utilization of health care services endemic population of Khurda district of Orissa.

Investigators: Dr.A.S.Kerketta, PI, Dr.B.V.Babu, Dr.S.S.S.Mohapatra, Mr.R.K.Das and Mr.P.K.Jangid

Starting date: January 2001; Duration: 2 years.

Objective:

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

Background:

Filarial lymphedema in endemic community poses an important health problem. Progress of oedema in several cases not only bring grotesque elephantoid swelling of limbs, that interfere with mobility, but is frequently accompanied by several bouts of inflammatory reactions (ADL) in the host that incapacitate to persue the normal activities. To arrest this

chronic progressive stage and reversing back to normal healthy stage, no satisfactory drug regimen has been reported. Long term use of DEC has not shown any significant result. Recent reports have shown that ADL episodes, that is ascribed to be a marker of clinical progression in filarial lymphoedema, often originates from opportunistic infections in affected sites of unhealthy limbs or from other body foci in endemic population of Orissa. Use of foot care and stringent hygiene of affected limb was reported to reduce frequency of ADL attacks and further progressions of oedema. Hence, current study is planned to evaluate long term regimen with oral antibiotic with foot care to assess its efficacy, acceptability and cost efficacy.

Regimens:

1. Foot care + DEC (6 mg/kg. B.W. x 12 days) and to be repeated every 3 months for 1 year.
2. Foot care + Oral Penicillin (Penicillin 'G' 8,00,000 unit, one unit twice daily for seven days repeated every 3 months X 1 year).
3. Foot care + Topical antibiotic (Betadine ointment) as and when required. Foot Care: Which will continue regularly for one year includes.
   - i) Cleaning of foot with soap and water.
   - ii) Regular application of white field oitment between the webs and toes to prevent fungal infection) and smoothen the skin.
   - iii) Regular clipping of toe and finger nails (it is also important to prevent the patients from injuring the skin by scratching affected limbs due to itching.
   - iv) Prompt attention to all injuries in the body (including minor ones elsewhere in the body).

Progress:

The endemic villages around Bhubaneswar namely Patrapada, Panichhatra and Mallipada were visited. Door to door survey was done and cases with lymphoedema of various grades were enlisted. All villagers including filariasis cases were addressed about the aim of the study, their responsibility as participants and the benefit of the study to the individuals as well as to the community. Their informed consent was obtained. A total of 340 participants with lymphoedema of various grades have been enlisted. These were divided into 3 groups and each group is earmarked for a particular drug regimen.

The groups are selected randomly, so far 305 cases around 100 in each group in three drug regimen groups have been identified. They have been selected based on exclusion and inclusion criteria.

Each case will be subjected to detailed clinical assessment, parasitological status (mf and CFA (ICT) before any of these regimens are randomly ascribed. The treatment will be supervised. Their general clinical as well as lymphoedema status will be recorded by periodic clinical examination and measurement of oedema diameter at various points as has been used earlier.

Treatment seeking behavour and utilisation of health care services by population.

2.MALARIA

2.1.1 Studies on sibling species of Orissa

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

Starting date: July 1999; Duration: 3 years

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.

Progress:

Seven districts viz. Keonjhar, Nayagarh, Dhenkanal, Khurda, Jagatsinghpur, Puri and Berhmpur have been surveyed. *Anopheles culicifacies* B & C were prevalent in these areas and *An. Fluviatilis* S Was found only in Khurda and Dhenkanal district. The chromosomal preparations were studied under phase contrast microscope from ovaries of female vectors collected from the areas surveyed and dissected. Their distribution pattern and vectorial status related to malaria observed in villages studied in various districts are described (Table 3).

Table 3: Sibling species distribution in relation to malaria in different districts of Orissa.

District	Species	% of Complex	Anthropophilic Index %	SPR	SFR
Nayagarh`	An. culicifacies B C	 67 33	 18 43	13.2	11.3
Jagatsinghpur	An. culicifacies B	 100	 13	3	2.5
Khurda	An.culicifacies B C An.fluviatilies	 70 30 100	 12 21 40	8.8	8.1
Dhenkanal	An.culicifacies B C	 58 42	 15 27	18.47	14.36
Keonjhar	An.culicifacies B C	 55 45	 22 31	14.9	13.8
Puri	An.culicifacies B	 100	 21	2.5	0.5
Ganjam	An.culicifacies B C	 52 48	 17 23	15	12

The study revealed that in areas where both *An.culicifacies* B & C were present, the malaria incidence was more than 10 per cent. The malaria incidence ranged from 0.5 to 2.5% where *An.culicifacies* B alone was present.

The data on malaria incidence and susceptibility status of malaria vectors to different insecticides will be generated from all the districts in three seasons for comparison.

2.1.2 Situation analysis of malaria transmission in Bhubaneswar.

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

Starting date: March 2001 ; Closing date: March 2003

Collaboration: State Health Department, RHFW, BDA, ORSAC, BMC

Aims & objectives:

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

Progress:

The available information on morbidity and mortality of malaria recorded from different Govt. Health faculities catering to Bhubaneswar city was obtained. Central malaria laboratory records 4 to 14% SPR in last five years. Capital hospital data indicates that in the year 2001 alone, out of the total hospital admissions on malaria, 97 deaths reported. The city map was prepared showing different zones. The demographic data reveals that the population of the city is 4,23,465 (1991 census). There are 59 authorized and 131 unauthorized slums with a population of 1,90,565 which is about 45% of the total population of the city.

Entomological survey was conducted in the city having both slum and urban locality. Both adult and larval collections were done in morning and evening hours. A total of 1737 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 observed. Besides, the vectors of lymphatic filariasis and dengue were also found. By dissecting the *Cx.quinquefasciatus* all the larval stages of *W.bancrofti* were detected.

Table-4 Relative abundance of different species of mosquitoes in Bhubaneswar

Species	Per man hour density
Aedes aegypti	2.0
Ae.albopictus	4.0
Ae.vitatus	1.0
An.annularis	2.0
An.culicifacies	0.6
An.hyrcanus	1.3
An.stephensi	5.5
An.subpictus	3.5
An.vagus	6.5
Cx.quinquefasciatus	35.0
Cx.gelidus	6.0
Cx.vishnui (group)	10.5
Ma.uniformis	2.0
Armigeris sps.	6.5

3. TRIBAL HEALTH AND NUTRITION

3.1.1 Intervention programme on nutritional anaemia and haemoglobinopatheis amongst some primitive tribal population of India (A multi-centric national task force project, Ministry of Health, Government of India)

Investigator : Dr. G.P. Chhotray,

Starting date : October 1999; Duration : 4 years

Aims and objectives:

(i) To find out the prevalence and aetiology of nutritional anaemia.

(ii) Clinical evaluation, management and monitoring of detected cases of anaemia and haemoglobinopathies.

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

Progress:

Detailed clinical examination and laboratory investigations has been performed in total 416 bondo tribes belonging to 7 villages of Bondo Hill to find out the prevalence of nutritional anaemia and other hereditary haematological disorders. Clinically anaemia was found to be most predominant manifestation as observed in more than 75% of the populations examined. Based on the level of haemoglobin in blood, 65.4% (9 - < 11 g/dl of Hb) and 17.1% (7 - 9 g/dl Hb) of cases were found to have mild and moderate degree of anaemia respectively. Only 17.5% of the cases had normal level (>11g/dl of Hb) of haemoglobin in the peripheral blood (Table- 5). Microscopic examination of the peripheral blood smear revealed that majority of the cases had microcytic-hypochromic blood picture. A total of 5 (1.2%) cases were found to be sickle positive (HbAS) as tested by 2% sodium metabisulphite incubation test and haemoglobin electrophoresis. Based on HbA2, and HbF level estimation, only 2 individuals (0.5%) were identified to have b-thalassaemia. The study is in progress. Intervention programme will be implemented as per the schedule in the 2nd phase of the study.

Table-5

Village (No)	Level of Haemoglobin (g/dl)							
	Severe <7		Moderate7 to 9		Mild 9 to <11		Normal >11	
	No	%	No	%	No	%	No	%
1. Andrahal (n = 45)	0	0.0	4	8.9	34	75.6	7	15.5
2. Dumuripada (n = 83)	0	0.0	5	6.0	58	69.9	20	24.1
3. Sileiguda (n = 52)	0	0.0	11	22.0	36	68.0	5	10.0
4. Padeiguda (n = 14)	0	0.0	9	64.3	4	28.7	1	7.0
5. Mudulipada (n = 107)	0	0.0	29	27.0	63	59.0	15	14.0
6. Bondapada (n = 68)	0	0.0	10	14.7	38	55.9	20	29.4
7. Badapada (n = 47)	0	0.0	3	6.4	39	83.0	5	10.6
Total (n = 416)	0	0.0	71	17.1	272	65.4	73	17.5

3.1.2 Intervention programme for Cholera, intestinal parasitism, Vit-A deficiency and scabies amongst some primitive tribal population of Orissa. (A national task force project, Ministry of Health, Government of India)

Investigators: Dr. G.P. Chhotray, Dr. S.S.S. Mohapatra and Dr. B.B. Pal

Starting date : March 2000; Duration : 5 years

Aims and objectives:

(i) A comprehensive assessment of health status and epidemiological profile in respect of cholera, intestinal parasitism, Vitamin A deficiency and scabies will be performed in 4 identified primitive tribes such as Didayi, Bonda, Kondha and Juanga out of the 13 primitive tribes residing in Koraput, Dhenkanal, Phulbani and Keonjhar districts of Orissa.

(ii) Demographic profile studies reflecting the morbidity and mortality patterns arising out of these diseases and their clinical evaluation.

(iii) To assess awareness of health, health culture and related behaviour to carry out various intervention programmes with a view to enhance their acceptibility.

(iv) To plan and execute various intervention programmes among these beneficiaries with a view to augment the existing health care delivery system in those areas.

(v) 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.

During the period under report, a total of 416 individuals from Bondo tribe were subjected to detailed clinical examination and necessary laboratory investigations to find out the prevalence of cholera, intestinal parasitism, Vitamin-A deficiency and scabies among this tribe.

Sixty stool samples / rectal swabs were collected from different sample villages of Bondo hill. Rectal swabs were collected from all fresh cases of diarrhoea before any antibiotic was administered. Bacteriological analysis was performed in all stool samples collected after being transported to R.M.R.C. in Cary-Blair medium using standard techniques. Of the total cases, 40 (66.67%) were found to be positive for *V. cholerae* and 10 (16.67%) for *E. coli*. Further serotyping of V. *cholerae* have shown 16 (26.67%) cases to be *V. cholerae* O1 (Ogawa) serotype and 24 (48.0%) to be *V. choleare* O139 serotype. This investigation was carried out during a diarrhoeal epidemic reported from this Centre.

Microscopic examination of 416 stool samples indicated that 52.3% of individuals were infected with different groups of intestinal parasites. Hookworm was the predominant infection (39.7%) followed by *E histolytica* (3.6%), Round worm (3.1%), *T. trichuria* (1%) and Giardia (0.7%). The age and sex wise distribution of the parasites prevalent among the sample population has been depicted in Table 6.

Table 6: Intestinal parasitism amongst Bondo tribe studied

Age	Total Population	Protozoa		Helminthis				Total No.(%)	Male No.(%)	Female No.(%)
		E.hist-olytica	Giardia	A.lumbric-oides	Hook Worm	T. tric-hiura	H. nana			
1-14	237 (128/109)	9 (3.8)	2 (0.8)	10 (4.2)	100 (42.2)	2 (0.8)	1 (0.4)	124 (52.3)	68 (28.7)	56 (23.6)
> 15	179 (59/120)	6 (3.4)	1 (0.6)	3 (1.7)	65 (36.3)	2 (1.1)	0 (0.0)	77 (43.0)	20 (11.1)	57 (31.8)
Total	416 (187/229)	15 (3.6)	3 (0.7)	13 (3.1)	165 (39.7)	4 (1.0)	1 (0.2)	201 (48.3)	88 (21.2)	113 (27.2)

Vitamin-A deficiency was found to be prevalent among 78 individuals examined in the form of night blindness in 21 cases, Bitot's spot in 21 cases, conjuctival xerosis in 36 cases (Table 7)

Table 7 : Vitamin-A deficiency amongst Bondo tribes

Age	Total Population	Bitot's Spot	Conjunctival Xerosis	Night Blindness	Total No. (%)	Male No. (%)	Female No. (%)
1-14	237 (128/109)	13 (5.5)	18 (7.6)	12 (5.1)	43 (18.1)	25 (10.5)	18 (7.6)
≥15	179 (59/120)	8 (4.5)	18 (10.1)	9 (5.0)	35 (19.6)	18 (10.1)	7 (9.5)
Total	416 (187/229)	21 (5.0)	36 (8.9)	21 (5.0)	78 (18.8)	33 (7.9)	35 (8.4)

Scabies was observed to be one of the major clinical feature among the population examined so far. 63 cases were identified to be positive for scabies, of which 36 were of infective form and 27 cases (6.5%) non-infective form (Table 8).

Table 8: Scabies amongst Bondo tribes.

	Total Population (M/F)	Infective	Noninfective	Total No (%)	Male No. (%)	Female No. (%)
1 – 14 (Children)	237 128/109	22 (9.3)	13 (5.5)	35 (14.8)	19 (8.0)	16 (6.8)
≥15 Adult	179 59/120	14 (7.8)	14 (7.8)	28 (15.6)	17 (9.5)	11 (6.5)
Total	416 187/229	36 (8.7)	27 (6.5)	63 (15.1)	36 (8.7)	27 (6.5)

The intervention programme will be instituted soon after the sample survey of the Bondo tribe.

3.1.3 Comprehensive study on delivery of health care research for capacity building amongst the primitive tribes of Orissa. (Adhoc ICMR task force project)

Investigators: Dr. G.P. Chhotray, Dr. A.Mohapatra & Dr.J.J.Babu Geddam

Starting date : Dec 1999; Duration of the project : 3 years

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Investigators: Dr. G.P. Chhotray, Dr. A.Mohapatra & Dr.J.J.Babu Geddam

Starting date : Dec 1999; Duration of the project : 3 years

Aims and objectives:

1. A comprehensive assessment of health status and epidemiological profile amongst the two primitive tribes of Orissa.
2. Demographic profile 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 the primitive tribes.
4. Study of their dietary habits and assessment of the nutritional status with reference to various nutritional deficiency disorders as per the specific geoclimatic and sociobiological context of different primitive tribes.
5. In-depth study of genetic diseases in various hereditary haematological disorders like Haemoglobinopathy (Sickle cell anaemia, Thalassemia etc.)
6. To study the health culture and health related behaviour so as to carry out various intervention programmes in the primitive tribal population and longitudinal follow-up.

Background informations:

This is a community based comprehensive study on delivery of health care research for capacity building amongst two primitive tribes of Orissa namely "Bondo" and "Didayi". The study has been initiated in the "Bondo" tribe first. The basic information regarding Bondo primitive tribe and the population survey of the community in the sampled villages has been collected independent of the census data (Table 9). A comprehensive assessment of health status, epidemiological and demographic profile, habit, habitats, existing health care facility, drinking water facility, cultural habits has been done.

Basic information:

The "Bondos" are the most primitive tribes of Orissa. They are ferocious in nature among all primitive tribes. They are distributed in high hills in 20 - 25 villages / hamltes of two Grampanchayats located towards the remote south-western tip of Malkangiri district in an inaccessible Bondo hill of Khairput block.

Origin:

The origin and affiliation are obscure but thought to be members of the Munda sub group of Austro-Asiatic family.

Habit & Habitat:

They are famous for their affiliation for native culture, love for simple easy going life, fondness for dance, music and liquor and their arrogance towards heterogeneous contact. They have remained unaffected by the march of civilization and still maintain primitive social tradition and culture.

Diet & Dietary Habit

Millets :

The staple food of Bondos is Gruel (Entra) prepared from ragi and other minor millets and is taken along with the boiled green leaves or vegetables or dried fish.

Rice :

Rice is taken as special food on festive occasions and in communal feast during birth, wedding and death rites to break the monotony of life.

Vegetables :

They use vegetables such as brinjal, pumpkin, bitter-gourd, onion, chillies, mushrooms and different verities of green leaves grown in the forest.

Fruits :

Bondos eat various types of fruits such as jack fruit, banana, guava and papeya etc.

Meat :

They eat beef, Mutton, pork, chicken, buffalo, birds, white ant, red ant, crabs, grass hoppers, snails and fish. Meat is taken on special occasions.

Dietary habits :

Ordinarily two principal meals are taken by them in a day one in the mid day and the other in the night in addition, gruel is taken as break fast along with onion, chilly, a little salt and tamarind, when they go out and to the field. All the members of the family eat at the same time and all of them eat in separate place. They don't follow hygenic measures before and after taking food. Water is not invariably taken after food. Milk and milk products are not taken by them.

Drinks and other intoxicants :

They usually prepare and take four types of alcoholic drinks. They are Safung (Sagopalm juice), Pandam (bear prepared from cereals), Boun sugar (prepared from Mahua's flower) and Ulin Sugar (prepared from mango). Out of these drinks Sago Palm juice obtained from Salap tree is the most favourite. It is enjoyed in group or in isolation irrespective of age and status.

Social Organisation

The Bondos are patriolocal and patriarchal. They are endogamous but the clans are exogamous. Monogamy is commonly prevalent where as polygamy can not be ruled

out. Divorce and widow marriage are not uncommon. Selection of spouse is left to the choice of children. The interesting feature is that the bride is more aged than the groom. Bride price in form of kind and cash is paid.

Life style and religion

They observe some kind of rituals in each important stage of life such as birth, marriage and death. The dead body is usually cremated. They worship local deity and other demi God, which represent the mother earth.

Socio-Economic condition:

The main occupation is agriculture and depend on agricultural goods and hunting. They grow cereals, paddy, rice and pulses etc. The homes in the hamlet are very small consisting of two rooms, one large 8'x6' and another small 5'x4' used for sleeping, cooking and granary.

House hold articles are extremely limited to meet the bare necessities consisting of few earthen pots, a bow and a bunch of arrows and a fishing trap. They use scanty clothes to cover the private parts of the body. A loin cloth 3'x1.5' for male, 2'x1' for female. The females cover the upper part of the body by silver necklace..

The family is the smallest and most important social unit comprising of husband, wife and their children. They are of nuclear type.

The demographic profile of the Bondo tribe as compared to that of Malkangiri district, Khairput block and Orissa being depicted in Table 10. It is observed that the decadal growth rate is lowest 12.2 is comparison to the block (40.2), district (25.9) and state (30.0).

The vital statistics in the form of crude birth rate, infant mortality rate and crude death rate amongst the Bondo population studied so far has been shown in Table 11, in comparison to national and state scenario.

A detail clinical examination has been performed in 416 (237 children and 179 adult) individuals belonging to "Bondo" tribe and has been enumerated in Table 12. It has been observed that fever was the most common clinical presentation as found in 17.7% cases in paediatric age group followed by cough and upper respiratory infection, malaria and gastrointestinal disorders, where as in adults cough with upper respiratory tract

infection was observed in 15.1% individuals followed by fever in 16.8% of cases. During the period total 416 blood slides were collected of which 55 (13.2%) were found to be positive for malaria infection. The slide falciparum rate was 11.1% and spleen rate was found to be 33.1% in the community studied (Table 13).

The nutritional status of the "Bondo" children aged 0 - 15 years were examined by means of Anthropometry taking % weight for age (Gomez classification), % height for age and % weight for height as the indicators which is enumerated in Table 14. This indicates that more than 70% of children are suffering from different degree of malnutrition.

Table 9 : Population of Bondo community in sample villages.

Sl. No.	Name of the Village	Total Household	Population		
			Male	Female	Total
1.	Mudulipada	41	69	95	164
2.	Padeiguda	62	122	136	258
3.	Sileiguda	75	132	150	282
4.	Bandiguda	54	83	131	214
5.	Dumuripada	120	202	248	450
6.	Bondapada	59	83	118	201
7.	Badapada	93	151	195	346
	Total	**504**	**842**	**1073**	**1915**

Table 10 : Demographic Profile of Bonda Tribe

	Orissa State	Malkanagiri District	Khairput Block	(2GPs) Bonda Hill
GeographicalArea (SqKm)	155,707	6115	339.00	130
Population (1991 census)	31,659,736	42,1917	27,321	5313
Densisty of Population (per SqKm)	203	69	81	40
Sex ratio (Females / 1000 males)	971	985	1019	1188
Literacy	49.1	16.1	17.6	7.8
Decadal growth rate (1981-1991)	30.0	25.9	40.2	12.2

Table 11: Vital statistics of the Bondo population of the studied sample villages, year 2000.

Sl No	Villages	Total Population	CBR	IMR	CDR	S D R			
						Fever	Malaria	TB	GE
1.	Mudulipada	164 (69 / 45)	10.5	0	24.4	18.3	0	0	0
2.	Padeiguda	258 (122 / 136)	7.75	0	21.1	0	0	3.9	0
3.	Sileiguda	90 (38/52)	57.9	0	0	0	0	0	0
4.	Bondiguda	214 (83/131)	15.3	0	32.7	23.4	4.7	0	0
5.	Dumuripada	450 (202/248)	40.3	4	20.0	11.1	0	0	0
6.	Bondapada	201 (83/118)	7.4	0	18.4	9.95	4.9	0	0
7.	Badapada	346 (151/195)	11.6	0	26.0	8.7	5.7	0	0
NATIONAL- INDIA			29.0	79	10.0				
STATE - ORISSA			27.8	114	11.7				
DIST - MALKANGIRI			25.0	95	8.0				

Table 12 : Comprehensive health status of population studied (n=416)

Sl. No	Disease	Children 1-14 yrs n=237 (57.0%) No. (%)	Adult ≥15 yrs n=179 (43.0%) No. (%)
1.	Respiratory diseases		
	Cough & URI	42 (17.7)	27 (15.1)
	Asthma & Bronchitis		2 (1.1)
2.	Fever	44 (18.6)	30 (16.8)
3.	Malaria	35 (14.8)	20 (11.2)
4.	Gastro-intestinal Diarrhoea Dyscentery	14 (5.9)	11 (6.1)
5.	Cardio vascular hyperten-sion		16 (8.9)

6.	Infectious diseases · Tuberculosis · Leprosy · Yaws · Hepatitis		 1 (0.6) 1 (0.6) 1 (0.6) 1 (0.6)
	Total	**135 (57.0)**	**110 (61.5)**

Total no. of affected - 244 (58.7)
Total no. non affected - 172 (41.3)

Table 13 : Malaria situation in Bondo population

Sl. No.	Village	Spleen rate	No. slide	No. slide	SPR	SfR
1.	Mudulipada	26.1	55	6	10.9	10.9
2.	Padeiguda	36.4	65	8	12.3	9.2
3.	Sileiguda	28.6	51	5	9.8	7.8
4.	Bandiguda	27.8	47	5	10.6	8.5
5.	Dumuripada	27.0	83	11	13.3	13.3
6.	Bondapada	30.0	68	10	14.6	10.3
7.	Badapada	38.8	47	10	21.2	17.0
	Total	**33.1**	**416**	**55**	**13.2**	**11.1**

Table 14 : Nutritional status of Bondo children aged 0 - 15 years with reference to NCHS standard.

Nutritional status	% weight / age No. (%)	% height / age No. (%)	% weight / height No. (%)
Normal	Between 90 & 110 26 (12.1 %)	> 95 92 (42.8 %)	> 90 67 (34.5%)
Mild malnutrition	Between 75 & 89 65 (30.2%)	87.5 - 95 66 (30.7 %)	80 - 90 45 (23.2%)
Moderately malnutrition	Between 60 & 74 80 (37.2%)	80 - 87.5 41 (19.1%)	70 - 80 40 (20.6%)
Severely malnutrition	< 60 44 (20.5%)	< 80 16 (7.4%)	< 70 42 (21.7%)

3.1.4 Intervention for hereditary common hemolytic disorders among the major tribals of sundargarh district of Orissa

Investigators : Dr.R.S.Balgir, Dr.B.P.Dash, Dr.A.S.Kerketta, Mr.B.Murmu and Dr.G.Bulliyya

Starting date: February 2000; Duration: Five Years

Aims and objectives:

i). Screening and identification of vulnerable tribals, namely, Bhuyan, Munda and Kharia for hemoglobinopathy, thalassemia and G-6-PD Deficiency, ii). Sensitisation, motivation and education through audio-visual aids like posters, charts and pamphlets for carrier detection of above genetic conditions, iii). To provide information for prospective and retrospective genetic/marriage counseling to the affected persons, iv). Imparting of relevant training to the State's local health authorities, like Lab. Technicians, health workers, etc. v). Periodic follow up for evaluation, intervention and clinical management of affected cases through local PHC/hospital, and vi). To develop a suitable intervention package for prevention and control of hereditary disorders like hemoglobinopathy, thalassemia, G-6-PD deficiency, Rhesus blood group incompatibility.

Brief background:

The frequency of sickle cell hemoglobinopathy (3-14%), beta-thalassemia trait (2-8%) and G-6-PD deficiency (5-16%) is quite high among the tribal population of Orissa. These hereditary disorders are a major public health problem and cause high degree of anemia, morbidity, mortality and fetal wastage among the vulnerable people. Tribals of Sundargarh district, namely Bhuyan, Munda and Kharia are highly prone to hemolytic anemia, jaundice, painful crisis, etc. This project has been designed with the objective of screening of major tribal communities of Sundargarh district for sickle cell hemoglobinopathy, G-6-PD deficiency and Rhesus blood group incompatibility.

Progress of work:

One village of Bargaon Block in Sundargarh district belonging to Kharia community, comprising of about 350 individuals has been selected for screening using appropriate sampling technique. A total of 121 subjects have been screened so far for hemoglobinopathies, ABO and Rhesus blood groups, G-6-PD deficiency. No case of sickle cell disorder was detected out of 121 persons screened. Beta-

thalassemia trait was found in 34 cases (28.1%) in the village. However, 26 (21.5%) persons had G-6-PD enzyme deficiency, out of which 6 were female heterozygotes. Two members of a family were found Rhesus negative. The study is in progress.

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

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

Aims and objectives:

To study the morbidity pattern of the elderly among three primitive tribal groups;

To screen for malnutrition, dietary habits and food intake patterns;

To compare the finding with tribal and non-tribal groups of other states and;

To find out the possible causes and to suggest remedial measures.

The elderly population aged over 60 years were enumerated from the respective population list available with the Micro-projects functioning for their all round development. The proportion of elderly population was estimated to be around 6-7 percent of the total population. These are Langia Saura Development Agency of Serango block in Gajapati district, Dongria Kondh Development Agency of Bissam Cuttack block in Rayagada district and Kutia Kondh Development Agency of Belghar block in Phulbani district. The study sample was obtained from villages selected randomly. All the elderly subjects in each selected village were included in the study. Different standard investigatory methods have been used for collecting village schedules, demography, socio-economic status, diet survey, anthropometry, anaemia status and clinical examination.

Observations:

A total of 490 elderly subjects belonging to Dongria and Kutia Kondhs (355; M-154 and F-201) and Langia Saura (135; M-51 and F-84) primitive tribes were studied. The mean values of anthropometric variables (body weight, height, armspan, mid-arm circumference, biceps and triceps skinfold measurements and haemoglobin) are not significantly different between the two primitive tribals studied. The prevalence of chronic-energy deficiency (CED) is assessed using

Table 15 Prevalence of anaemia in primitive tribes.

Anaemia grade (Haemoglobin g/dL)	D/K Khond (N=355)	L Saura (N=135)
Normal (>11.0)	16.9 (60)	7.4 (10)
Mild (10.0-10.9)	15.5 (5.5)	6.7 (9)
Moderate (7.0-9.9)	47.3 (168)	50.4 (68)
Severe (≤ 7.0)	20.3 (72)	35.1 (48)

Figures in parentheses indicate sample number.

Table 16. Prevalence of hypertension.

Blood pressure (mmHg)	D/Kutia Kondhs	Langia Saura
Systolic BP < 140	85.9 (305)	60.7 (82)
140 - 159	6.8 (24)	23.0 (31)
160 ≥	7.3 (26)	16.3 (22)
Diastolic BP < 90	83.4 (296)	51.8 (70)
91 - 110	15.5 (55)	44.4 (60)
110 ≥	1.1 (4)	3.8 (5)

body-mass index (kg/m^2) as a nutritional index Normal value being - BMI>18.5. CED was found to be very high both among Langia Saura (89.4%) and Kondhs(88.9%). Body mass index was found to be below normal in 23.7% of Langia Saura and 16.9% of Kondhs. Prevalence of severe grade of CED (BMI is less than 16.0) was 12.6% and 20.3% in Langia Saura and Kondhs respectively. The prevalence of anaemia (Hb<11 g/dL) was greater in Langia Saura (92.6%) than in Dongri/Kutia Kondhs (83.1%)(Table 15). Also, severe grade of anaemia (Hb<7.0 g/dL) was higher in Langia saura (35.1%) than in Dongria/Kutia Kondhs (20.3%). The elderly people of Langia Saura manifested higher rates of anaemia than found amongst Kondhs.

The criteria of Hypertension was taken as mild, moderate or severe degree when systolic blood pressure exceeded 140, 160 and 180 mm Hg respectively. It was observed that the tribe Langia Saura had higher prevalence of both systolic as well as diastolic hypertension than kondhs. The diastolic hypertension was also more pronounced (48.2%) amongst Langia Saura (Table 16).

Dietary intake:

Other than green leafy vegetables, the intake of foodstuffs among these primitive groups are much less than the intakes of general tribal and non-tribal populations according to parameters used in NNMB surveys conducted in Orissa during 1975-1999 and the Recommended Dietary Intakes (RDI, 1981) suggested for sedentary adults (currently no RDI is available for elderly Indians). These primitive groups are deficient for both protein and energy intakes. All the nutrients are deficient in terms of quantity with an exception of vitamin-A intake, because of higher consumption of green leafy vegetables. The intake of these nutrients are deficient when compared with the Recommended Dietary Allowance (RDA,1990) for adult Indians.

3.1.6 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 and Dr.B.P.Dash

Funding: Intramural; Starting date: April 2001; Duration : 3 years

Objectives:

(i) To study the G6PD deficiency among the male tribal population of m a l a r i a l endemic areas.

(ii) To characterise the G6PD deficiency variants at the molecular level.

(iii) To study the clinical proforma, morbidity and mortality pattern in G6PD deficiency population with special reference to G6PD Orissa.

The study has been initiated in Keonjhar district. Total 75 individuals amongst Juanga tribe were screened for G6PD deficiency by DCIP method. Of the total cases 8(10.7%) were found to be positive for G6PD deficiency. G6PD assay and G6PD enzyme purification has been done from the deficient bloods. Biochemical characterisation and molecular analysis work is in progress.

4. DISEASE SURVEILLANCE

4.1.1 Assessment of disease burden due to Leptospirosis

Investigators: Dr.B.Ravindran, Dr.B.K.Das (SCB Medical College, Cuttack), Dr.J.J.Babu Geddam and Dr.P.K.Sahoo

Starting date: January 2001; Closing date : January 2002

Aims and Objectives:

The objective of this multicentric task force study is to make an initial estimate of the morbidity and mortality due to Leptospirosis and to assess determinants of disease occurrence including the factors pertaining to reservoirs, hosts and environment.

Progress:

The blood samples were collected from the S.C.B.Medical College, Cuttack and rural parts of the Orissa. Blood samples are being collected as per the inclusion criteria of symptoms such as cough and haemoptysis, unexplained breathlessness, bleeding tendencies including sub-conjuctival haemorrhge jundice and oliguria. Fifty seven human sera samples have been collected and tested by lepto dipstick assay. Nine of the samples were found positive by Lepto dipstick. The patients were informed and treated as per the protocol. All the collected samples were sent to National Leptospirosis Referral Centre at RMRC, Port Blair for confirmation by Microaggulination Test (MAT) for specific serovar. Preliminary results have indicated the prevalence of *"Autumnalis"*

4.1.2 HIV surveillance in Orissa -

Investigators: Dr. G.P. Chhotray and Dr. B.B.Pal, Mr. H.K. Khuntia and Mr. C.R. Samantaray

Starting date :1987; Duration : Ongoing

The sero-surveillance for HIV infection has been carried out in this Centre since 1987 with the support from National Aids Control Organization (NACO), New Delhi. Referral blood sample from State AIDS cell are being screened for HIV infection. A total of 10 samples has

been screened this year for AIDS HIV antibodies by ELISA & spot test, who were all Indian nationals. Out of these, 5 were ELISA positive and WB positive for HIV infection. For western blot testing samples were sent to NICED, Calcutta. Out of 5 HIV positive patients 4 were male and 1 was female and all were harbouring HIV 1 virus only.

Though the seropositivity rate of HIV infection in Orissa is low compared to national figure, precautionary measures should be undertaken by strengthening blood screening in all blood banks and amongst the high risk group population such as STD patients, sex workers, drug abusers etc.

4.1.3 Bacteriological and Molecular analysis of *Vibrio cholerae* associated with endemic and epidemic cholera in Orissa and water analysis

Investigator : Dr. G.P. Chhotray and Dr. B.B. Pal

Starting date: July 1999

Objectives:

1. To isolate different strains of *Vibrio cholerae* from human diarrhoea patients admitted to different hospitals during cholera outbreak and from the cholera endemic areas of Orissa for strain typing and antibiogram to assist diarrhoeal surveillance activity of the State.
2. Molecular characterization of various strains of *V.cholerae* by ribotyping, restriction fragment length polymorphism of various virulence genes and by PCR based DNA finger printing.

Post Cyclonic follow-up:

During the period under report, May to November constituted the peak seasons for sporadic outbreaks of diarrhoeal disorders in different parts of Orissa. The district earlier affected by cyclone were Puri, Jagatsinghpur and Cuttack districts. The cases affected by sporadic outbreaks from these areas during the period was examined for the causative agent of diarrhoea. 198 rectal swabs were collected in Cary Blair transport media and were bacteriologically analysed. 78.3% were culture positive for various enteropathogens of which *V. cholerae* was the predominant enteropathogen isolated from 81 cases followed by *E. coli* in 71 and *Shigella* in 3 cases. Further bacteriological and serological

confirmation on 81 isolates of *V. cholerae* revealed 62.4% of *V. cholerae* O1 Ogawa and 35.8% of *V. cholerae* O139. The resistance pattern of *V. cholerae* O1 and O139 were ACoFzNNaS and AFzNS respectively, where as both serogroups were sensitive to ciprofloxaciline, norfloxacin, chloramphenicol, tetracycline. The strains are further being characterized in colloboration with NICED, Calcutta.

Analysis of water samples for *V. cholerae*

A total of 20 water samples from 10 ponds, 3 paddy fields, 4 open wells and 3 tube wells were collected from the cyclone affected areas of Rushipada village of Puri district, where there was a sporadic outbreak gastroenteritis. The water samples were subcultured in double strength alkaline peptone water and subcultured on TCBS plates. *V. cholerae* O139 was isolated for 50% of water samples collected from ponds. The rest of the water samples did not yield *V.cholerae.*

The strains will be studied for clonality and molecular typing in collaboration with NICED, Calcutta

4.1.4 Referral services rendered for hereditary haematological disorders:

Investigators: Dr. R.S. Balgir, Dr. G. P. Chhotray, Dr. M.R. Ranjit, Dr. B.P.Dash and Mr.B.Murmu, Mr. B. N. Sethi, Mr. T. Moharana, Mr. K. C. Dalei

This center is providing referral diagnostic services to the cases referred from different PHCs, peripheral hospitals and 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 center had also provided 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%).

Co-ordination Committee meeting for filariasis control in Orissa in progress.

Institutional Human Ethical Committee is in progress.

Hon'ble Minister of State for Health, Govt. of Orissa, Sri Debiprasad Mishra, Prof. N.K. Ganguly, Director General, ICMR, New Delhi and Dr. S. Pattanaik addressing RMRC scientists.

5.COMPLETED PROJECTS

5.1.1 Project Title : Immunobiological studies in Bancroftian filariasis.

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

Collaborator : Dr. B.K. Das, S.C.B.Medical College, Cuttack

Duration : From March 1995 to August 2001

Objectives :

i) To study the role of inflammatory cytokines in relation to severity of acute filariasis.

ii) To follow-up infected subjects and endemic normals to correlate immune response to mf sheath

iii) Evaluate the prevalence of putatively immune "endemic normals" in different filarial endemic areas.

Results :

An inverse association was observed between circulating filarial antigen (CFA) and antibodies to mf sheath (published in Parasite Immunology). The observations led to the conclusion that protective immunity in human filariasis (as opposed to microfilarial immunity) is mediated by antibodies to mf sheath. Further it was observed that mf carriers do not produce antibodies to mf sheath even after loss of circulating mf. These observations led to studies on IgG sub-group analysis in chronic filariasis and Endemic Normals in the context of presence/absence of CFA and anti-sheath antibodies. The results indicates that EN and elephantiasis cases had comparable levels of filarial specific IgG sub-groups while hydrocele cases consistently had higher levels of all the four subgroups of filarial IgG. It is crucial to note that these analysis were undertaken only in CFA negative anti-sheath positive cases in all the three groups. When all these cases were taken together and analyzed based on status of anti-sheath antibodies, IgG2 levels were significantly more in subjects with anti-sheath antibodies in comparison to those who did not have such antibodies. Conversely, filarial specific IgG4 were significantly more in those deficient in anti-sheath antibodies in comparison to those with such antibodies.

Conclusions:

The study has revealed the biological importance of anti-sheath antibodies in the context of protective immunity in human filariasis. The role played by TNF-α in acute filarial disease was demonstrated and the study also provided evidence for existence of a significant cohort of putatively immune subjects in filariasis endemic areas.

Publications from the project in peer- reviewed journals:

1. B.K.Das, P.K.Sahoo and B.Ravindran (1996) A role for tumor necrosis factor in acute lymphatic filariasis. ***Parasite Immunology***, 18: 421-423.

2. Sahoo, P.K., Geddam, J.J.Babu, Satapathy, A.K., Mohanty, M.C. and Ravindran, B. (2000). Bancroftian filariasis: prevalence of antigenaemia and endemic normals in Orissa, India. ***Transactions of the Royal Society of Tropical Medicine and Hygiene,*** 94:515-517.

3. Satapathy, A.K., Sahoo, P.K., Geddam, J.J. Babu, Mohanty, M.C. and Ravindran, B. (2001). Human bancroftian filariasis: Loss of patent microfilaraemia is not associated with production of antibodies to microfilarial sheath ***Parasite Immunology***,23:163-167.

4. B. Ravindran (2001) Filariasis Control: Ethics, Economics and Good Science. ***Lancet*** 358:246

5. 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- 13 year follow-up of microfilariae carriers and Endemic Normals in Orissa, India. ***Parasitology*** 124 : 191 - 201

5.1.2 Project Title : Longitudinal study on Brugia malayi filariasis in Orissa

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

Duration : From January 1999 to January 2001

Objectives :

The study was initiated to compare the prevalence of filarial infection and vectorial status in cohort of Sakhigopal, Puri district.

Results:

Brugia malayi filariasis exists as a pocket in Sakhigopal area of Puri district Orissa, where survey was made a decade ago. Again a follow up study was initiated in 1999 to study the natural history of Brugian filariasis. Longitudinal study on vector distribution of *Brugia malayi* filariasis revealed Mansonia *annulifera* as the primary vector species followed by *Ma. uniformis* present in the study area. However the same phenomenon was earlier observed in 1989 survey also where *Ma. annulifera* comprised 67% followed by *Ma. uniformis* . Seasonal prevalence study shows that there are two peaks during March and October in both the survey but there is a decreasing trend in the vector density in the recent survey. As compared to 1989 survey the vector infection and infectivity rates remain almost same and comparable. *Ma. uniformis* the secondary vector of Brugian filariasis though prevalent through out the year attains a peak during August and September. The annual transmissioon index and risk of infection index were 406 and 0.04 respectively for *Ma. annulifera* . Both the species of *Mansonioides* are susceptible to DDT, Dieldrin, Malathion and synthetic pyrethroids. Parasitological resurvey of endemic inhabitants reveals that 28.4% of the endemic normal (1989 survey) developed disease while 63.7% of mF carrier and 42.8% of acute filarial disease cases have no detectable mf in their peripheral blood smear.

Conclusions:

The study reveals that after a decade the *Brugia malayi* foci still exists though there was 29.4% reduction in vector *Ma.anulifera* density. Therefore, intervention measures need to be taken to eliminate the infection from the foci.

5.1.3 Project Title : Effect of annual single dose of DEC on the transmission dynamics of filariasis.

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

Duration : From January 1999 to January 2001

Objectives :

1. To study the impact of annual single dose of DEC on community level on transmission parameters like infection rate, infectivity rate and L3 load.

2. To assess the impact of single dose DEC treatment on intensity of microfilaraemia.

Results:

During Nov.1997, Khurda and Puri district of Orissa were covered by annual single dose of DEC in the majority of population in the district. The study did not show any significant decline in mF prevalence in current survey (8.2%), as against 9.6% before the mass DEC campaign. *Culex quinquefasciatus* was the dominant species and comprises 73% of the total collection and there is no significant change observed in the density pattern and seasonal prevalence. The infectivity rate though observed for 10 months before the trial was found only for 6 month with high infectivity rates after the trials.

Conclusions:

With 70% DEC coverage by single dose of DEC once, transmission was found to be only partially interrupted only for six months and no significant reduction was seen in infectivity rate. Therefore, annual single dose of DEC if repeated for some more years would help in interrupting the transmission by reducing the infectivity rate.

5.1.4 Project Title : Multi-centre study of community directed treatment (ComDT) of lymphatic filariasis (WHO/TDR funded)

Investigators : Dr. B.V. Babu, Dr. K. Satyanarayana, Dr. G.P. Chhotray and Dr. R.K. Hazra

Duration : March 1997 to August 2000

Objectives :

1. To implement and assess the process and effectiveness of a system of community-directed treatment (ComDT) of lymphatic filariasis.

2. To identify factors responsible for coverage and compliance of treatment.

Results :

Community directed treatment (ComDT) is a new concept of drug delivery. Under ComDT, communities themselves can decide, plan and carry out drug distribution. They are given freedom to procure drug from the local health authorities, storage of tablets, selection of drug distributors, process of drug distribution, resolve the problems during drug distribution, monitor the side effects and maintain records. Health services will involve only at the initial level of implementation, particularly sensitisation of communities regarding the concept of ComDT and preparing the health system officials at primary health centre level. The study has been initiated in East Godavari district of Andhra Pradesh to investigate the effectiveness of community directed treatment (ComDT) on the one hand and health services implemented treatment (HST) on the other hand in carrying out mass DEC drug distribution for the control of lymphatic filariasis. Various qualitative and qualitative surveys methods were employed during evaluation of the programme.

In East Godavari district of Andhra Pradesh, around 77% of people received tablets, but only 64% of people consumed the tablets. ComDT approach in 2 PHCs could achieve 60% coverage, while HST approach could achieve 68% coverage. The proportion of people who do not swallow even after receiving the tablets was more (17%). The treatment coverage is higher in HST (80% reception of tablets and 68% actual consumption) than ComDT (74% and 60%). With regard to receiving tablets or actual consumption, there are no significant differences in terms of sex and age.

The reasons for not receiving the tablets by households were investigated. The most dominant reason was 'distributor did not come' and this was followed by other reasons like 'people are not available', 'not aware of the programme', etc. These problems can be solved by repeated visits of distributor and by more canvassing. This will lead to achieve higher coverage. Another, important issue, to devise methods and advocacy procedures is to enhance consumption rate after receiving the tablets. Around 17% of the people who received the tablets have not consumed due to various reasons such as forgot/missing, fear of side effects, perceiving unnecessary, etc. Mostly, it is due to lack of proper knowledge on the benefits of the programme and 44.2% forgot/missed the consumption of drug after accepting the same at the household level. Proper health education measures and advocacy strategies have to be undertaken to minimize this segment of people. Fear of side effects is also an important factor that affected the treatment coverage. Among those who had consumed tablets, about 12% reported one or more side effects. Most commonly reported problems are gastric irritation, fever, giddiness, headache, etc.

The results indicated that implementation of the programme exclusively by the community

(ComDT) is not an advantageous model to be applied in Indian context, without active involvement of health system. As there is well-developed health system with primary health centre network in rural areas, the health system may take up this type of control activities effectively, provided they were furnished with appropriate strategies and skills. The peripheral health workers or health volunteers backed by the health system had greater credibility among the people. Also the study indicated that greater community involvement was associated with higher treatment coverage. There is need to integrate the elements of community participation thoroughly in the programme implementation. Hence a model of drug delivery system to be implemented by the government health system with active community participation has to be developed. The factors that influenced the coverage and compliance of treatment are recognised in terms of health services related, community related and drug related factors.

The study identified some key-factors to be followed for better implementation of the programme towards the elimination of lymphatic filariasis. They are (1) greater political commitment by the State level administration, (2) stronger health sector involvement and their commitment, (3) community involvement in drug delivery, (4) comprehensive training of health workers, particularly on the management of side effects and (5) extensive IEC activities.

Conclusions:

It is concluded that implementation of mass drug administration exclusively by the community is not advantageous model to be applied in Indian context, without active involvement of health system. However, the study indicated that greater community involvement was associated with higher treatment coverage. The factors that influenced the coverage and compliance of treatment are recognised and the study identified key factors to be followed for better implementation of the programme towards the elimination of lymphatic filariasis.

Publications:

1. B.V. Babu, G.P. Chhotray, R.K. Hazra and K. Satyanarayana – Perceptions and interactions of vulnerable groups with the government health services. ***Indian Journal of Social Work***, 60 (1): 54-65 (2000).

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

5.1.5 Project title : An exploratory study on recording and reporting systems of lymphatic filariasis at the community level (WHO/TDR funding)

Investigators : Dr. B.V. Babu, Mr. A.S. Acharya, Mr. P.K. Jangid and Mrs. G. Mallick

Duration : August 1999 to August 2000

Objectives :

1. To identify the type of recording system or type of information existing on filariasis at community level.
2. To report the present method of recording and reporting system of filariasis adopted by health system.
3. To identify the type of information needed for the effective execution of mass drug distribution for filariasis control.
4. To develop feasible method of recording and reporting by the health system, including involvement of periphery level health personnel and other personnel associated with community activities in the recording and reporting process. And ultimately, to develop methods for bi-directional reporting to ensure more reliable reporting and strengthening the drug delivery system.

Results :

This project is undertaking in two districts namely, (1) Khurda district of Orissa State and (2) East Godavari district of Andhra Pradesh, and from each district 4 blocks were selected. The studies on recording and reporting on mass drug distribution were undertaken in East Godavari district of Andhra Pradesh.

Average population covered under a sub-centre is about 2000-7000 with one health worker in Andhra Pradesh and about 6000-8000 with two health workers (male & female) in Orissa. The health workers record the event like births and deaths during their field visits at both Orissa and Andhra Pradesh. The same information is also reported to the Panchayat / Mandal by the help of health workers in Andhra Pradesh. But, in Orissa if a person is interested to collect birth/death certificate, the certificate will be issued by

Panchayat after obtaining information from health institution. Anganwadi workers assist health workers of their respective villages to record the information on births and deaths. All the information collected at village level by the health workers is reported to PHC once in a month and the same information is forwarded to the higher authorities at district and State levels. Health workers at both the sites expressed their concern that though filariasis is a problem, there is no mechanism for recording and reporting, as they do for immunisation, anti-natal and post-natal check-up, and for the chronic diseases like malaria, leprosy, etc.

Prior to mass drug administration of DEC, the village wise enumeration was undertaken by the health workers. The details (age, gender and presence of overt chronic filarial condition) of all family members were enumerated in registers. Enumeration registers are available during DEC distribution and number of tablets issued to each individuals are to be noted in the register. Health workers have given these enumeration registers to community members (in ComDT areas) or to volunteers selected by them (in areas where health system did the distribution). The study indicated that the volunteers (selected by the health workers) were not recorded properly, but later on the health workers filled the forms. In ComDT areas, where health workers gave training to Community Drug Distributors (CDDs), the CDDs recorded the details of drug distribution (date of delivery of delivery and number of tablets).

In some villages, the details of drug delivery were collected from community drug distributors and community leaders through in-depth interviews and these findings were compared with the figures available from registers. It indicated that this rapid method of information collection is reliable and feasible.

Conclusions:

The study identified the mechanism of recording and reporting various issues of community level and at various government health institutions. Also the issues and ways of recording and reporting during mass drug administration for control of lymphatic filariasis were studied. The study developed a rapid method of reporting, particularly on coverage and compliance. This method, based on the information of community drug distribution, is feasible and reliable.

5.1.6 Project title : A study on socio-economic burden of lymphatic filariasis in coastal Orissa

Investigators : Dr. B. V. Babu, Mr. A.S. Acharya, Mr. P.K. Jangid and Mrs. G. Mallick

Duration : January 1999 to April 2001

Objectives :

1. To study the importance of filariasis to individuals and the community in relation to other problems and to study the societal reaction to the individual effected with chronic disease.
2. To study the degree of physical impairments of individuals with various forms of the disease and its influence on the social activities.
3. To analyse the extent of dependence and burden of the effected individuals on the family members.
4. To study the direct costs to individuals and households of treatment and other medical care for different forms of filariasis outside the government control programme.
5. To study the impact of the disease on the activities, productivity and economic situation of affected individuals and their families.

Results :

Economic loss due to chronic conditions

This study has been undertaken in Khurda district of Orissa. 12 villages were selected randomly and house-to-house census was undertaken. Also, it is attempted to record the presence of any overt filarial conditions among these household members. Altogether, a total of 377 patients with different overt chronic filarial manifestations were identified. From this a cohort of 62 patients (12 male elephantiasis + 22 female elephantiasis + 21 hydrocele + 7 elephantiasis and hydrocele) were selected following stratified random sampling, for further studies on various aspects of direct and indirect costs due to chronic lymphatic filariasis. For examining some aspects of costing due to chronic disease, in a case control design, age, sex and occupation matched controls were selected for all the 62

patients, from the nearest households. To estimate the direct and indirect costs, all the cases as well as controls were visited for every four months for one year (total three visits: July-October 1999, November, 1999-February 2000, March-June 2000), to cover all seasons of the year in this study area.

Treatment costs:

Out of the 58 chronic filariasis patients, only 43 (74.14%) had sought treatment and spent money in this one year of study period. They incurred a geometric mean of INR 396 (approximately US $ 8). Relatively male elephantiasis patients spent more than the remaining patient groups. The details of various components of the expenditure on treatment reveal that out of the total amount spent, 63% was spent on purchase of medicines. It is followed by the expenditure on stay and food when they go for treatment (18%). The expenditures for travel (8%), on escorted person (8%) and for consultation (3%) are relatively less.

Loss of productive time:

The data on daily activities of patients and controls reveal that total absenteeism or total loss of work was recorded in 22.6% of visits among chronic patients. However, among controls also, absenteeism is reported during 13.4% of the visits. The difference between patients and controls is statistically significant (c^2 = 5.26, P<0.05). Patients with chronic filariasis spent 4.94±3.33 hours per day on productive work when compared to 6.06±3.22 hours by the controls, with a statistically significant difference. The trend is similar and the differences are significant for both the sexes as well as among all pathology groups, but difference between the male elephantiasis patients and their controls is not significant. The loss of mean productive time is slightly more among women than men, however the differences between men and women (t=1.70, P>0.05) and among different pathology groups (F=1.05 P>0.05) are not significant.

The logistic regression analysis revealed that the disease condition had significant impact on complete absenteeism from productive work (P<0.01). The patients' characteristics, i.e., sex (P<0.001), age (P<0.001) and family type (P<0.01) have also influence on the absenteeism. Similarly, an attempt was made to examine the influence of these variables on number of productive hours. The disease condition had a significant effect on the number of productive hours per day (P<0.001). The number of productive hours per day was also affected significantly by sex (P<0.001), age (P<0.001) and family type (P<0.05) of the individual. The R^2, the measure of goodness of fit indicates that 16% of the variation in the number of working hours per day is explained by these variables.

Studies on acute filarial cases (fortnightly surveillance):

These investigations were initiated in March 2000 and continued till February 2001. Two villages were selected for this study component (census of these villages was carried out earlier) and acute clinical manifestations characterised by the presence of local signs and symptoms such as pain, tenderness, local swelling and warmth in the groin, with or without associated constitutional symptoms such as fever, nausea or vomiting were monitored in these two villages for every fortnight. During every fortnightly visit, the incidence of acute cases was recorded for a period of one year. For the individuals identified as affected with acute attacks during the fortnight, the clinical symptoms and their duration were recorded. A total of 116 acute episodes was recorded within the population of 1328 during the one year surveillance period (annual incidence is 87.35 per 1000). The data pertaining to direct costs and indirect costs for all ADL cases were collected. The data on treatment seeking behaviour and KAP were also collected. The data on the epidemiology of acute filarial episodes and socio-economic burden are to be analysed.

Conclusions :

The present study indicates that chronic as well as acute forms of lymphatic filariasis pose considerable burden on the individuals and their families. It also reveals that the productivity of patients considerably influenced by their disease condition along with age and sex. Increasing age with the progression of the disease further worsens the situation by lessening the working time. The costs of treatment for various filarial conditions are considerable for poorer families, who mainly depend on minor farming and daily labouring. In addition to all these, social agony and psychological impairment, particularly with chronic filariasis are considerable and most of the patients found themselves burden to the family.

Publications:

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

5.1.7 Project Title : Immunology of lymphatic filariasis: Modulation, Variation and Immunity (E.C.U. funded)

Fund allocated : EU 48,000/-

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

Collaborator : Prof. Rick Maizels, University of Edinburgh, U.K.

Duration : From August 1998 to August 2001

Objectives:

1. To understand the nature of protective immunity in human filariasis in the context of infection and disease.
2. To study the role of non-protein filarial antigens in induction of protective immune response in human and experimental filariasis.

Results :

One of the objectives of this project has been to understand the existence, if any, of protective immunity against filarial infection in human Bancroftian filariasis. The IgG subclass reaching to filarial proteins and carbohydrade were studied in clearly delineated group of human filariasis.

The relative contents of carbohydrates and proteins in various developmental stages of *S.digitata* were quantified. The adult female and microfilarial extracts were found to be very rich in carbohydrates while the E-S antigens of adult female parasites contained relatively more carbohydrate than protein mass. The adult male worms on the other hand were found to be a protein dominant developmental stage of filarial parasites. The carbohydrate-protein ratio in males was about 8-10 fold less in comparison to adult female worms or microfilarial stages.

There was a clear dichotomy in reactivity of IgG2 and IgG3 to Fil.Cho and that of IgG4 to Fil.Pro in the three categories of cases selected across the disease spectrum in human filariasis. Patients with chronic filarial disease and endemic normals were found to have significantly more IgG2 and IgG3 antibodies to Fil.Cho in comparison to microfilariae

carriers. On the other hand Mf carriers produced significantly more IgG4 antibodies to Fil.Pro than endemic normals and patients with chronic filarial disease. This dichotomy in IgG2 and IgG3 reactivity to Fil.Cho and of IgG4 reactivity to Fil.Pro was not dependent on clinical manifestation since the pattern of reactivity was alike in endemic normals and chronic filariasis cases who are at the two extreme poles of the disease spectrum. The difference rather appeared to be dependent on the status of active filarial infection. When the sera samples were classified according to presence or absence of circulating filarial antigen (CFA, a more definite parameter of active filarial infection than microfilaraemia), individuals with CFA (with or without mf in circulation) were found to possess significantly more IgG4 antibodies to Fil.Pro than to Fil.Cho. Those who tested negative for CFA had significantly higher levels of IgG2 and IgG3 antibodies to Fil.Cho.

Antibodies to MF sheath has been an interesting Immunological parameter in human filariasis. We had demonstrated earlier an inverse relationship between anti-sheath antibodies and microfilaraemia. This was interpreted as a host immune mechanism for MF removal. However our recent observations of significant inverse association between anti-sheath antibodies and circulating filarial antigens implied thereby that anti-sheath antibodies are produced much before maturation of adult worms. These observations point towards the interesting possibility that (a) the source of antigenic stimulus for production of anti-sheath antibodies could be developing larvae and not necessarily microfilariae and that (b) antibodies to sheath have been induced as a result of presence of MF in their system in the past. It is not known if MF carriers who are uniformly deficient in anti-sheath antibodies would develop sheath specific antibodies subsequent to loss of microfilaraemia. To test this possibility two cohorts of MF carriers were analyzed for presence of circulating MF and anti-sheath antibodies after 10-13 years. The first group of 59 subjects were microfilaraemic 10 years before and were all treated with a full course of DEC (6 mg/kg for 12 days). The second group of 43 cases were microfilaraemic 13 years ago and were not administered DEC. The status of microfilaraemia as well as anti-sheath antibodies in these subjects after 10 to 13 years were studied. About 58% of MF carriers had cleared MF after 10 years in the first group and 63% of them were amicrofilaraemic after 13 years in the second group. However in both the cohorts about 92% of them continued to harbour adult worms as indicated by presence of CFA. Interestingly more than 90% of these who had cleared microfilaraemia were still free of anti-sheath antibodies clearly indicating that microfilaraemia individuals loose irreversibly ability to generate antibodies to MF sheath. These results also strengthen our hypothesis that about 80% of amicrofilaraemic individuals displaying anti-sheath antibodies would not have been microfilaraemic in the past. The anti-sheath antibodies in them could have appeared as a result of exposure to L3. Anti-sheath antibodies could thus be

caused as an important window in understanding the natural history of filarial infection in human communities.

Conclusions :

The study revealed the importance of filarial carbohydrate antigens in both experimental and human filariasis. The findings of the study offered an opportunity to unravel the nature of protective immunity in against larval stages in human filariasis and the relationship between presence of adult worm infection and absence of antibodies to Mf sheath.

Publications from the project in peer-reviewed Journals:

i. Ravindran, B., Satapathy, A.K., Sahoo, P.K. and Geddam, J.J. Babu (2000). Protective immunity in human Bancroftian filariasis: inverse relationship between antibodies to microfilarial sheath and circulating filarial antigens. ***Parasite Immunology,*** 22: 633-637.

ii. Mohanty, M.C., Satapathy, A.K., Sahoo, P.K. and Ravindran, B. (2001). Human Bancroftian Filariasis – A role for Antibodies to Parasite Carbohydrates. ***Clinical and Experimental Immunology,*** 124(1): 54-61.

iii. Ravindran, B. (2001). Are inflammation and immunological hyperactivity needed for filarial parasite development? ***Trends in Parasitology.*** 17(2): 70-73.

5.1.8 Project Title : Immunological components of anti-disease response in human and experimental malaria.

Investigators : Dr. B. Ravindran, Dr. A.K. Satapathy, Dr. P.K. Sahoo and Ms. M.C. Mohanty

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

Duration : From June 1994 to Feb. 2001

Objectives :

i) To study auto-antibodies in relation to severity of disease.

ii) To correlate the levels of auto-antibodies with pro-inflammatory cytokines in human cerebral malaria.

Results :

A cell-ELISA using glutaraldehyde fixed normal rabbit erythrocytes was developed for quantification of anti-gal in human sera. This assay was compared with three other (commonly used) immunoassays viz. a) agglutination b) enhanced agglutination and c) lipid ELISA-assays for detection of anti-gal in human sera. The cell-ELISA was found to be the most sensitive assay followed by lipid-ELISA, enhanced agglutination and agglutination assay in decreasing order. Further anti-gal levels were assayed in 72 human sera and compared with DNA-binding antibodies. A significant positive correlation was found between anti-gal and DNA-binding antibodies. Absorption of sera with fresh rabbit erythrocytes (which express abundant a-galactose on their surface) resulted in significant removal of both anti-gal and DNA-binding antibodies. Affinity purified anti-gal were found to be reactive to DNA, actin, myosin and tubulin indicating the polyreactive nature of naturally occurring anti-gal antibodies in human sera. The observed polyreactivity was not an exclusive feature of sera collected from tropical countries – anti-gal affinity purified from sera of North Americans were also found to react with DNA. The demonstration of polyreactivity of anti-gal indicates a much wider biological role for this autoantibody in humans and old world primates.

In our efforts to delineate factors that contribute to clinical complications associated with *P.falciparum* malaria we had demonstrated a role for inflammatory cytokines/molecules such as TNF - a and IFN – g and nitric oxide. The detailed results were reported in the annual report of 1999-2000. We had also demonstrated along with other investigations that malarial 'endotoxin' like molecules would be responsible for induction of such inflammatory cytokines/molecular and that antibodies to phospholipids in human serum are inversely associated with TNF- a level. Further studies were undertaken to study the status of naturally occurring antibodies to a -linked galactose in malaria. There was a clear hierarchy in the levels of anti-Gal when probed with polyvalent and anti-human IgG reagents. The levels of anti-Gal were found in the following ascending order: Endemic Normals>non-complicated *P.falciparum* cases>cerebral malaria (survivors) > cerebral malaria (non-survivors). The observed hierarchy of anti-gal IgG was consistent only with IgG1 subgroup and not for the other IgG sub-groups indicating a role for IgG1 anti-gal antibodies in determining the clinical severity of *P.falciparum* malaria.

Conclusions:

The study has revealed the importance of autoantibodies in protective immunity in human malaria. It has also highlighted the role of inflammatory cytokines in mediating clinical complications such as cerebral malaria.

Publications from the project in peer-reviewed journals :

1. B.K.Das, S.Parida and B.Ravindran (1996) A prognostic role for anti-phosphatidyl choline antibodies in human cerebral malaria. ***Clinical and Experimental Immunology***, 103: 442-445.

2. A.K.Satapathy and B.Ravindran (1996) A quantitative cell-ELISA for a-galactose specific antibodies in human malaria. ***Journal of Immunoassay***, 17: 245-256.

3. B.Ravindran, P.K.Sahoo & A.P.Dash (1998) Lymphatic filariasis and Malaria: Concomitant parasitism in Orissa, India. ***Transactions of Royal Society of Tropical*** **Medicine** ***and Hygiene***, 92: 21-23.

4. A.K. Satapathy and B. Ravindran (1999) Naturally occurring alpha-galactosyl antibodies in human sera display polyreactivity. ***Immunology Letters***, 69: 347-351.

5.1.9 Project Title : Hemolytic genetic disorders among the six major tribal populations of Orissa

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

Duration : From July 1999 to January 2001

Objectives :

1. To study the incidence of some hemolytic disorders such as hemoglobinopathies, G-6-PD deficiency and some blood groups.
2. To identify the at risk tribes in Orissa.
3. To look for some rare and abnormal genetic characters of clinical importance.
4. To suggest the best control, preventive and intervention measures among the affected tribes.

Results :

According to the Census report of 1991, the scheduled tribes constituted 22.4% of the total population of Orissa. Of the 62 tribes of Orissa, 15 tribes are major tribes having their total population more than one lakh of each tribe as per 1981 census. These tribes are scattered in almost all the districts of Orissa.

Available literature suggests that there is wide range of variation regarding the prevalence of hemolytic genetic disorders like hemoglobinopathy, G-6-PD deficiency, Rhesus blood groups incompatibility, etc. in Orissa. Reports from other states such as Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Maharashtra, etc. suggest that there is a high prevalence of hemoglobinopathy among the tribals. Since the extent of the problem in the following six tribes, namely, Saura, Shabar/Lodha, Paraja, Bhottada/Dhottada, Khond, Gond of Orissa is not known, therefore, the present project has been designed to look into this aspect of the health problem.

Progress of work:

A total of 420 samples of three major tribals, namely, Lodha (78) from Mayurbhanj district, Bhattra (166) from Nawarangpur district and Paraja (176) from Koraput district were randomly screened for sickle cell hemoglobinopathy, beta-thalassemia, G-6-PD deficiency and, ABO and Rhesus blood group serology. Sickle cell gene was higher in Bhatra (18.1%) and Paraja (14.8%) in comparison to Lodha (0%) tribals.

The frequency of beta-thalassemia trait was (8.5%) in Paraja, (6.7%) in Lodha and (6.6%) in Bhatra.

The frequency of G-6-PD enzyme deficiency was high in Paraja tribe (15.9%) as compared to other tribes, namely, Bhattra (6.6%) and Lodha (5.1%). Cases of G-6-PD deficiency have been found in females showing the deficiency of the enzyme in heterozygous as well as in homozygous forms. High incidence of sickle cell hemoglobinopathy in Bhattra and Paraja tribes and of G-6-PD deficiency in Paraja tribe has been observed. Therefore, antimalarials should be used with caution in these tribes. Imparting of health education, awareness for genetic disorders and genetic/marriage counseling for the affected cases have been suggested for intervention by NGOs as well as the existing medical infra-structure of the state for prevention and control.

Conclusions :

The results of the study are expected to assist in mapping out the hemolytic genetic disorders among the major scheduled tribes of state.

6. GENERAL INFORMATION

6.1 PAPERS PUBLISHED (2000-2001)

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

2. Mandal, N .N. and Das, M.K. (2000). A four year follow –up study of filariae specific IgE response in individuals with hydrocele., *Indian Journal of Medical Research*,112: 203.

3. Ravindran, B., Satapathy, A.K., Sahoo, P.K. and Geddam, J.J. Babu (2000). Protective immunity in human Bancroftian filariasis: inverse relationsip between antibodies to microfilarial sheath and circulating filarial antigens. *Parasite Immunology*, 22: 633-637.

4. Dash, B.P. and Kar B.C. (2000) Priapism is rare in sickle cell disease in India, *JAPI*, 8(24): 255.

5. Mohanty, M.C., Sahoo, P.K., Satapathy, A.K. and Ravindran, B. (2000). *Setaria digitata* infections in cattle: parasite load, microfilaraemia status and relationship to immune response. *Journal of Helminthology*, 74: 343-347.

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9. Chhotray, G.P., Ranjit, M.R., Kumar, A. (2000). Periodicity of *W. bancrofti* microfilaraemia in Orissa, India. *J. Hum. Ecol* 11 (4) : 315 – 317.

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12. Babu, B.V., Chhotray, G.P., Hazra, R. K. and Satyanarayan, K. (2000). Perceptions and interactions of vulnerable groups with the Government health Services. *Indian J Soc Work*. 61(1) : 54 – 65.

13. Balgir, R.S.(2000). The Burden of Hemoglobinopathies in India and the Challenges Ahead. *Current Science*, 79(11):1536-1547.

14. Mohapatra, S.S.S., Bulliyya, G., Kerketta, A.S., Marai, N.S., Acharya, A.S. (2000). Iodine deficiency disorders in Bargarh district of western Orissa. *Indian Pediatrics*.; 37(17): 536-539.

15. Mohapatra, S.S.S., Bulliyya, G., Kerketta, A.S., Acharya, A.S. (2001). Thyroxin and thyrotropin profile in neonates and school children in an iodine deficiency disorders endemic area of Orissa. *Indian Journal of Nutrition and Dietics*.; 38;98-101.

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18. Babu, B.V. and Kusuma, Y.S. (2000). Association study of acid phosphatase locus 1 (ACP1) polymorphism and body mass variability in a lean Indian tribal population. *Indian Journal of Nutrition and Dietetics*, 37: 404-408.

19. Varma,G.R., Babu, B.V. and Rohini, A. (2000). – A study on knowledge about various family planning methods among rural population of West Godavari district, Andhra Pradesh. *Man in India*, 80 (3 & 4): 331-336.

20. Mohapatra, A., Geddam, JJB., Marai, N.S., Murmu, B., Bulliyya, G., Acharya, A.S., Satyanarayana, K. (2000). Nutritional status in preschool children in drought affected Kalahandi district of Orissa. *Indian Journal of Medical Research;* 111 (3): 90-94.

21. Beuria, M..K., Mandal, N.N., Bal, M.S. and Das, M.K (2001). Immediate type hypersensitivity reaction: an immunological marker for microfilarae negative individuals with hydrocele.*Current science* , 80: 125.

22. Beuria, M.K., Bal, M.S., Mandal, N.N. and Das, M.K. (2001). A long-term follow-up of asymptomatic amicrofilaraemic individuals living in a filariae endemic region of Orissa, India: Infection and Disease status. *Transactions of the Royal Society of Tropical Medicine and Hygiene,* 95: 408.

23. Mohanty, M.C., Satapathy, A.K., Sahoo, P.K. and Ravindran, B. (2001). Human Bancroftian Filariasis – A role for Antibodies to Parasite Carbohydrates. *Clinical and Experimental Immunology,* 124(1): 54-61.

24. Ravindran, B. (2001). Are inflammation and immunological hyperactivity needed for filarial parasite development? *Trends in Parasitology.* 17(2): 70-73.

25. Balgir, R.S .(2001). Pattern of Transhumance among the Muslim Gujjars in North-Western India. *South Asian Anthropologist,* 1(1): 7-12

26. Balgir, R.S. (2001). Genetic Epidemiology of sickle cell anemia in India, *Current Medical Trends,* 5(1): 872-88.

6.2 OTHER PUBLICATIONS OF RMRC SCIENTISTS:

1. Babu, B.V., Kusuma, Y.S. and Naidu, J.M. (2000). Ethnography of Jatapu tribe of Andhra Pradesh. *Man and Life,* 26 (3 & 4): 181-192.

2. Bulliyya, G. (2000). Fish intake and blood lipids in fish eating vs non-fish eating communities of coastal south India. *Clinical Nutrition.*; 19(3): 165-170.

3. Bulliyya, G. (2000). Key role of fats in coronary heart disease under progressive urbanization and nutritional transition. *Asia Pacific Journal of Clinical Nutrition.*; 9(4): 289-297.

4. Bulliyya, G. (2001). Alcohol consumption and risk from coronary heart disease. *The Indian Practitioner* 54(1): 47-51.

6.3 CHAPTERS IN BOOKS:

1. Balgir, R.S.(2000). Human Genetics, Health and Tribal Development in Orissa. In: Environment, Health and Development: Anthropological Perspective. P. Dash Sharma (Ed). S.C.Roy Institute of Anthropological Studies, Ranchi, pp.87-104.

2. Bulliyya, G. (2000). Habitual fish consumption in relation to arterial blood pressure: a study on fish consumers and non-fish consumers. In: P.Dash Sharma (eds) 'Environment, health and Development – An Anthropological Perspective. S.C.Roy Institute of Anthropological Studies. Ranchi: pp.11-21.

6.4 MEETINGS/ SEMINARS/SYMPOSIA ATTENDED:

1. Dr.S.K.Kar, Director delivered a talk as invited speaker on "Diagnosis and treatment of Kala-azar" in June 2000 at State Institute of Health & Family Welfare, Patna to Medical Officers on training organised by NAMP, Delhi.

2. Dr.S.K.Kar, Director delivered talk on "Chemotherapy of Kala-azar" at Nirman Bhawan, Delhi invited by ICMR & MOH & FW in June 2000.

3. Dr.S.K.Kar, Director chaired a scientific session in API, Orissa chapter meeting held at Swosti Plaza, Bhubaneswar on 10th November, 2000.

4. Dr.S.K.Kar gave a seminar talk at Utkal University on "Visceral Leishmaniasis : new perspectives in diagnostic approach" as invited by Utkal University, Dept. of Zoology on 4th March 2001.

5. Dr.S.K.Kar, Director attended the Filariasis meeting held on 21st and 28th March 2001 at RMRC and delivered a talk on "Filariasis".

6. Dr.S.K.Kar, Director delivered a talk on "Filariasis - Current perspective" at State Health Institute of F.W., Bhubaneswar in a meeting on Filariasis - action programme held on 16th November 2000.

7. Dr. M.K. Das, DD presented the research project proposal on "Immunological characterization of filarial antigen with potential protective response in endemic population" in the meeting of Task Force (Medical Biotechnology, Immunodiagnostics, Vaccines) of DBT, New Delhi on 10th August 2000.

8. Dr. M.K. Beuria, attended 14th National Congress of Parasitology, 23-26 April, 2000 at New Delhi and presented the paper on "Modulation of humoral antifilarial IgE response by Diethylcarbamazine treatment". (M.K.Beuria and M.K.Das).

9. Dr. M.S. Bal, RA attended 14th National Congress of Parasitology, 23-26 April, 2000 at New Delhi and presented the paper on "Antigenicity of filarial protease: Immunodiagnostic implications". (M.S.Bal and M.K.Das).

10. Mr. N.N. Mandal, RA attended 14th National Congress of Parasitology, 23-26 April, 2000 at New Delhi and presented the paper on "Immunologic studies in individual with hydrocele living in filaria endemic region of Orissa". (N.N.Mandal and M.K.Das).

11. Dr.R.K.Hazra, TO attended 14th National Congress of Parasitology, 23-26 April, 2000 at New Delhi and presented the paper on "Effect of annual single dose of DEC on transmission dynamics of filariasis" (N.Mohapatra, R.K.Hazra, H.K.Tripathy, S.K.Parida, R.K.Das and A.P.Dash).

12. Dr. B. Ravindran, DD attended as a member of the meeting of Task Force on Leptospirosis at ICMR, New Delhi on 18th April, 2000.

13. Dr. B.Ravindran, DD presented a paper on "Natural history of lymphatic filariasis: Need for paradigm shift" as a 'Guest Speaker' at National Academy of Sciences, Allahabad on, 3rd-6th November 2000.

14. Dr. B. Ravindran, DD presented a paper on " Development of vaccines for lymphatic filariasis; looking beyond Th1 -Th2 Paradigm" as 'Guest Speaker' and chaired a session on " Molecular strategies against Leishmaniasis" at an "International Symposium on Tropical diseases" CDRI, Lucknow on 7th-9th November 2000.

15. Dr.B.Ravindran, DD was invited as a faculty to teach Mahabaleswar training course on "Host parasite interactions" conducted by the Tata Institute of Fundamental Research, Bombay at Mahabaleswar 18th-23rd November, 2000.

16. Dr.G.P.Chhotray, D.D. attended 6th International conference on emerging infectious diseases in the Pacific Rim, Manila, Philippines, Jan 13-15, 2001.

17. Dr.G.P.Chhotray, D.D. presented a scientific paper on "Molecular Epidemiology of *V.cholerae* associated with out break of diarrhoeal disorder following the Super cyclone in Orissa" and chaired a session in the Free Paper Presentation at 49th National Annual

Conference of Indian Association of Pathologist & Microbiologist held at Safdarjang Hospital, New Delhi, 15th-19th November 2000.

18. Dr.G.P.Chhotray, DD attended the 28th Annual Conference of Orissa chapter of IAPM at Bhubaneswar on 9th September, 2000.

19. Dr.B.B.Pal, RO presented a paper on "Molecular epidemiology of *V.cholerae* associated with out break of diarrhoeal disorders following the Super Cyclone in Orissa" at the 28th Annual Conference of Orissa chapter of IAPM at Bhubaneswar on 9th September, 2000.

20. Dr.G.P.Chhotray, DD attended the JICA, NICED domestic programme on "Molecular epidemiology of diarrhoea with special reference to Cholera", 27th November to 6th December, 2000 at NICED, Calcutta and presented scientific paper on "Bacteriological & Molecular characterization of enteric pathogens isolated from diarrhoeal stool samples from post cyclone affected areas of Orissa.

21. Dr.G.P.Chhotray, DD attended National Seminar on Human Genetics, Health and Ethical Issues, held during 24th-26th March, 2001 at Utkal University, Bhubaneswar.

22. Dr.G.P.Chhotray, DD delivered a Guest lecture on "Emerging diarrhoeal disorder following Super cyclone" in National Symposium on Super cyclone and Eco-restoration effort in the State of Orissa "held at Utkal University on 30th March 2001.

23. Dr.G.P.Chhotray, DD was invited to deliver guest lecture on "Sickle cell disorder & haemoglobinopathies" at UGC Refresher course for teachers, Utkal University, September 2000, sponsored by UGC.

24. Dr.G.P.Chhotray, DD attended meeting of the Technical Advisory Group on lymphatic filariasis held on 29th August, 2000 held at DGHS, New Delhi.

25. Dr.R.S.Balgir, DD presented a paper entitled "Health Care Strategies, Genetic load and prevention of Haemoglobinopathies in Tribal communities of India" in the International Seminar on Haemoglobinopathies in South Asia - Problems and prevention held during 27-29th December 2000, Calcutta.

26. B.Murmu presented a paper on "Nutritional Status and Physical Growth among the Ashram School Tribal Children in Orissa" (Author: R.S.Balgir, B.Murmu and B.P.Dash) in the National Seminar on Tribal Health in India, Present Status and Future Strategies, held during 8-10th February 2001, New Delhi.

27. Dr.R.S.Balgir, DD presented a paper entitled "Genetic Diversity with special reference to Hemoglobinopathies in India" in the National Seminar on Genetics, Health and Ethical issues held during 24-26th March 2001, Bhubaneswar.

28. Dr.S.S.S. Mohapatra, AD participated in the 5th JBS Haldare Memorial Lecture in the Department of Anthropology Utkal University, Bhubaneswar on November 15, 2000.

29. Dr.S.S.S. Mohapatra, AD participated in the preliminary meeting on the National Task-Force Project "Operational evaluation of the stability of Iodine in Double Fortified Salt" on March 2, 2001 held at National Institute of Nutrition, Hyderabad.

30. Dr.B.V.Babu, SRO attended Final Data Analysis and Report Writing for ComDT Filariasis, organised by UNDP/World Bank/WHO special programme for Research and Training in Tropical Diseases (TDR), as Temporary Adviser in NICD, Delhi during 17-21, April 2000.

31. Dr.B.V.Babu, SRO attended Phase II protocol of the Multi-Centric Study on Advocacy for Sustained Treatment Compliance in lymphatic Filariasis as Elimination in India, organised by UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), as Temporary Advisor, in Pondicherry during 15-18 July, 2000.

32. Dr.B.V.Babu,SRO attended National Seminar on Human Genetics, Health & Ethical Issues, held in Utkal University, Bhubaneswar during 24-26th March, 2001.

33. Dr.A.Mohaptra, SRO attended Executive Body Meeting of "Society for Advancement of Community Health, Bhubaneswar" on 7th September 2000 & 14th October 2000.

34. Dr.G.Bulliyya, RO presented a paper entitled "Nutritional status of elderly Kondh's: a primitive tribe of Orissa" (Author: Dr.G.Bulliyya, Dr.S.S.S.Mohapatra, Dr. A.S.Kerketta & Mr.R.K.Das) at 33rd Annual Conference of the "Nutritional Society of India at NIN, Hyderabad during 1-2, December 2000.

35. Dr.G.Bulliyya, RO presented a paper entitled "Status of nutritional anemia in the elderly Paudi Bhuniya primitive tribe of Orissa" by Dr.G.Bulliyya, Dr.S.S.S.Mohapatra & Mr.A.S.Kerketta " in National Seminar on Human Genetics, Health & Ethical Issues" held at Utkal University, Bhubaneswar during 24th & 26th March, 2001.

36. Mr.A.S.Acharya ,RA presented a paper "Sequential Sampling Plans for multiple alleles at the locus" in III Annual Conference of Orissa Statistical Association held at PG Dept. of Statistics, Utkal University, Bhubaneswar on 18th February 2001.

37. Mr.A.S.Acharya, RA attended National Conference on Recent Trends in Mathematics at Institute of Mathematics and Application, Bhubaneswar on 27th May 2001.

38. Mr.R.K.Das, RA participated in the 1st International Conference on Health Sciences & VIII International Congress on Alternative Medicines, organised by Indian Board of Alternative Medicine, Calcutta on 2-3rd December, 2000 and presented a paper entitled "Antimalarial from Common Salt (Sodium Chloride).

39. Dr.B.P.Dash, RA presented a paper on "Genetic haematological disorders in Orissa" in the National Seminar on Human Genetics, Health & Ethical Issues, held during 24-26th March 2001 at Utkal University, Bhubaneswar.

40. Mr.A.N.Nayak, JRF attended National Seminar on Human Genetics, Health & Ethical Issues, organised by Dept of Anthropology, Utkal University, Bhubaneswar during 24-26th March 2001 and presented a paper on "Utilization of Services related to Safe Motherhood among the Scheduled Caste and Scheduled Tribe population of Orissa. An overview" (A.N.Nayak & B.V.Babu).

41. Dr. N. Mohapatra attended Joint co -ordination meetings of Partners for implementation of mass drug administration for filariasis control in Orissa on 22nd Nov. 2000 at Bhubaneswar.

42. Dr.R.K. Hazra, TO attended Joint co-ordination meetings of Partners for implementation of mass drug administration for filariasis control in Orissa on 22nd Nov. 2000 at Bhubaneswar.

43. Dr. R.K. Hazra, TO presented the paper on "Effect of annual single dose of DEC on transmission dynamics of filariasis" (author: N.Mohapatra, R.K.Hazra, H.K.Tripathy, S.K.Parida, R.K.Das and A.P.Dash.) in the Fourteenth National Congress of Parasitology held at Delhi from April 23-26, 2000.

6.5 TRAINING AND WORKSHOPS ATTENDED:

1. Dr.G.P.Chhotray, DD attended the National workshop on Networking of knowledge board institutions for disaster management held on 14th & 15th July 2000 at Bhopal, as nominated by ICMR, New Delhi.

2. Dr.R.S. Balgir, DD participated in the workshop on "Biomedical Research and Internet" held during 10-12th February 2001 at National Informatics Centre, Bhubaneswar.

3. Dr.S.S.S.Mohapatra, AD, attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

4. Dr.A.Mohapatra, SRO attended the training on "Controlled Clinical Trial" at National Institute of Epidemiology, Chennai from 30th October to 10th November 2000.

5. Dr.M.R.Ranjit, SRO attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

6. Dr.G.Bulliyya, RO, attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

7. Dr.A.S.Kerketta, RO attended the training on "Controlled Clinical Trial" at National Institute of Epidemiology, Chennai from 30th October to 10th November 2000.

8. Dr.A.Mohapatra, SRO attended WHO workshop on "District Action Plan for Mass Drug Administration for Filarial Elimination" from 31st August to 1st September 2000.

9. Dr.S.K.Parida, TO attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

10. Dr.R.K.Hazra, TO attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

11. Mr.A.S.Acharya attended workshop on Bioinformatics & Medical Research at JB Tropical Disease Research Centre, Mahatma Gandhi Institute of Medical Sciences, Sevagram (Wardha), Nov. 24-26, 2000.

12. Mr.A.S.Acharya, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

13. Mr.P.K.Jangid, SA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

14. Dr.B.P.Dash, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

15. Mr.R.K.Das, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

16. Mr.N.Marai, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

17. Ms.Madhuchhanda Mohanty, RA participated in Winter School on Immunology at Kovalam, Kerala, India from 7-13th February, 2001.

18. Dr.P.K.Sahoo, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

19. Mr.D.P.Hansdah, RA attended a workshop on Biomedical Research and the Internet held during February 10-12, 2001 at National Informatics Centre, Bhubaneswar.

6.6 DISTINGUISHED VISITORS:

1. Dr.T.N.Naik, Deputy Director, NICED, Calcutta delivered a lecture on "Implications of Rotavirus in childhood diarrhoea and recent advances in Hepatitis on 12th January, 2001.

2. Prof. B.C.Harinath, Director - Profesor & Head, Department of Biochemistry and JB Tropical Disease Research Centre, Mahatma Gandhi Institute of Medical Sciences, Sevagram visited the Centre in connection with Filariasis Cell and delivered a talk on "Immunodiagnosis of filariasis" on 22nd March, 2001.

3. Prof. L.N.Mohapatra, Former Director, RMRC, Bhubaneswar and Dean, AIIMS, Prof. R.K.Shinoy, Head, Department of Medicine, TD Medical College Hospital, Alleppy, Kerla and Dr.V.Kumaraswamy, Deputy Director, Tuberculosis Research Centre, Chennai visited the Centre in connection with Filariasis Cell. Dr.R.K. Shinoy delivered a talk on "Clinical aspects of filariasis" on 29th March, 2001.

4. Ms. M.Yamasaki, JICA India Office, DLF Centre, New Delhi visited this Centre with regard to "proposals for short term deputation of Japanese experts to RMRC to develop collaborative projects on Filariasis" on 30th October 2000.

5. Dr. U. Sengupta, Director, Central Jalma Institute for Leprosy delivered a lecture on "Leprosy-recent perceptive" on 3rd July 2001.

6.7 Training imparted:

(i) Prevalence of Group A b-haemolytic Streptococci (BHS) in the general community of an urban population of Bhubaneswar was studied for M.Sc. dissertation work by M.Sc. student under Dr.G.P.Chhotray

(ii) Isolation of Shigella from rectal samples of paediatric age group children – undertaken M.Sc. dissertation work by OUAT M.Sc. student under guidance of Dr. G.P.Chhotray.

(iii) Dr.P.K.Sahoo, Research Assistant was awarded Ph.D. degree for his thesis entitled "Studies on parasitic cytotoxic factors in human malaria" from Kalyani University under guidance of Dr.B.Ravindran, Deputy Director.

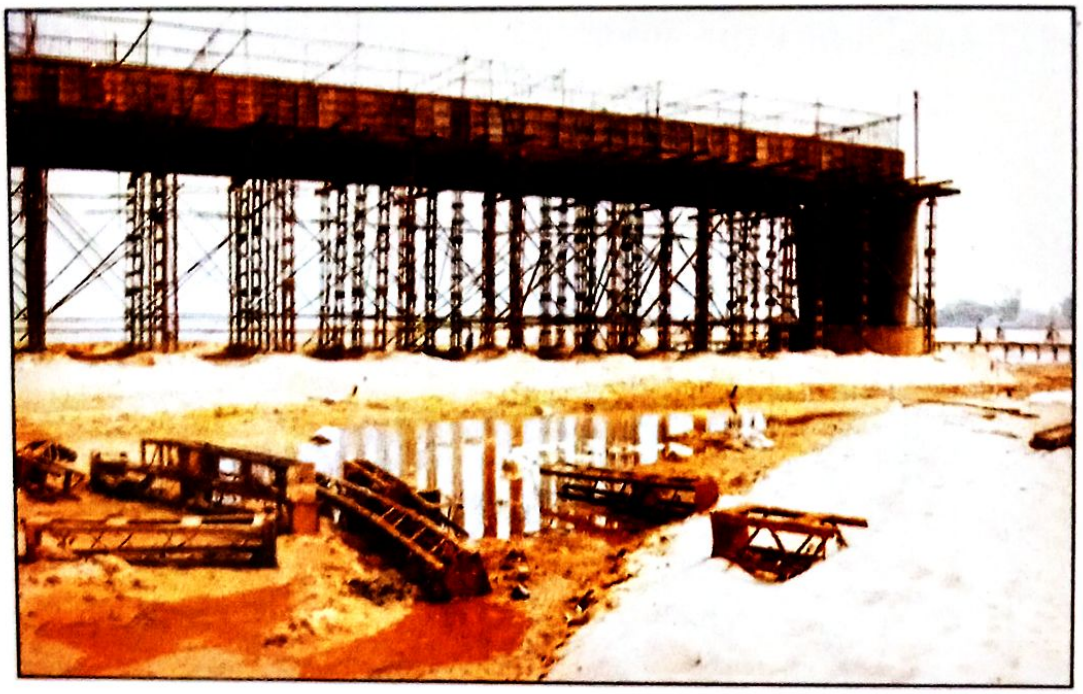
6.8 AWARDS AND OTHER RECOGNITIONS:

Dr.B.B.Pal, RO received the best paper award on "Molecular epidemiology of *V.cholerae* associated with out break of diarrhoeal disorders following the Super Cyclone in Orissa". 28th Annual Conference of IAPM, Orissa Chapter, R.M.R.C. (ICMR), NALCO, Bhubaneswar on 9th September 2000.

Dr.R.S.Balgir, DD was awarded Manorama Sapre Oration Award 2000 by the Indian Society of Hematology and Transfusion Medicine (ISHTM) at the 41st Annual Conference of ISHTM held during 24-26th November 2000, Mumbai. Dr.Balgir delivered the oration on the "The Genetic Burden of Hemoglobinopathies with special reference to Community Health in India & Challenges Ahead" on 24th November 2000 at Mumbai.

Dr.R.S.Balgir, DD was invited to Co-chair one of the Sessions of the International Seminar on "Hemoglobinopathies in South Asia – Problems and Prevention" on 28th December 2000, Kolkata.

Dr.R.S.Balgir, DD was elected to the Governing Council of the Indian Society of Human Genetics for the period 2001-2004 and attended the Governing Council Meeting held on 22nd February 2001 held at Hyderabad.



Major breeding source of *An. culicifacies* in the river bed pool near Bhubaneswar city.

Temporary water bodies at construction site of apartments is a major source of Anopheline vector in Bhubaneswar.

Inauguration of filariasis OPD at Capital Hospital, Bhubaneswar.

Malaria field survey : Spleenomegaly scoring.

6.9 MEMBERS OF THE 15TH SCIENTIFIC ADVISORY COMMITTEE:

1.	Dr.D.S.Agarwal B-24, Swasthya Vihar Delhi-110092.	Chairman
2.	Dr.S. Pattnayak B-91, Swasthya Vihar Delhi 110 092	Member
3.	Dr.R.C. Mahajan Emeritus Professor Ho No:78, Sector 24A Chandigarh 160 023	Member
4.	Dr.L.N. Mohapatra Ex-Director, RMRC GM-10, VSS Nagar Vani Vihar Bhubaneswar 751 004	Member
5.	Dr.Sandeep Basu Director National Institute of Immunology Aruna Asaf Ali Road New Delhi-110 067	Member
6.	Dr.B.B. Tripathy Retd. Prof. Of Medicine Saradiya Mission Road Cuttack-753001	Member
7.	Dr.Sarita Agarwal Addl. Professor Dept. of Genetics SGPIMS, Raebareli Road Lucknow 226 014	Member

8. Dr.R.K. Shenoy — Member
Former Prof. & HOD of Medicine
Brindavan, Church Road
Mullackal Ward
Alleppey 688 010

9. Prof.R.N. Rath — Member
Ex. Prof. Medicine
Professorpara
Cuttack-753012

10. Dr.Amit Ghosh — Member
Director
Institute of Microbial Technology
Sector39 A, Chandigarh-160036

11. Dr.S.K. Bhattacharya — Member
Director
National Institute of Cholera & Enteric Diseases
P-33, CIT Road Scheme XM
Beliaghata, Calcutta 700 010

12. Dr.P.K. Das — Member
Director
Vector Control Research Centre
Medical Complex, Indira Nagar
Pondicherry 605 006

13. Dr.Sarala K. Subba Rao — Member
Director
Malaria Research Centre
22, Sham Nath Marg
Delhi 110 054

14. Dr.Kamala Krishnaswamy — Member
Director
National Institute of Nutrition
Jamai-Osmania
Hyderabad 500 007

15. Dr.Dipika Mohanty — Member
Director
Institute of Immunohaematology
New Multi-storeyed Building
13th Floor, KEM Hospital Campus
Parel, Mumbai 400 012

16. Dr.M.D. Gupte — Member
Director
National Institute of Epidemiology
Mayor V.R. Ramanathan Road
Chetput, Chennai 600 031

17. Dr.Ashok Kumar — Member
Director
National Anti-Malaria Programme
22, Sham Nath Marg
Delhi 110 054

18. Director — Member
Health Services
Govt. of Orissa
Heads of the Dept. Building
Bhubaneswar 751 001

19. Director — Member
Medical Education & Training
Govt. of Orissa
Heads of the Dept Building, Bhubaneswar 751 001

20. Dr.G.C. Mishra — DG's nominee
Director
National Centre for Cell Sciences
NCCS Complex, Ganeshkhind
Pune 411 007

21. Dr.S.K. Kar — Member-Secretary
Director
Regional Medical Research Centre
Bhubaneswar 751 023

ICMR Representatives:

22.	Dr. Lalit Kant, Indian Council of Medical Research Ansari Nagar, Post Box No.4911 New Delhi-110029.	Sr.DDG
23.	Dr. Dipali Mukherjee, Indian Council of Medical Research Ansari Nagar, Post Box No.4911 New Delhi-110029.	Chief ECD
24.	Dr. Rashmi Arora, Indian Council of Medical Research Ansari Nagar, Post Box No.4911 New Delhi-110029.	DDG(ECD)

6.10 HUMAN ETHICAL COMMITTEE

1.	Justice (Mrs.) A.K.Padhi Former Judge, Orissa High Court 10, Bhasakosh Lane Nimchouri, Cuttack-753 002	Chairman
2.	Prof.L.N.Mohapatra Ex-Director, RMRC (ICMR), GM-10, VSS Nagar Bhubaneswar-751 004	Vice-Chairman
3.	Dr.B.B.Tripathy Retd. Prof. of Medicine Saradiya Mission Road, Cuttack-753 001	Member
4.	Dr.(Mrs.)P. Mohanty Hejmadi Ex-V.C. Sambalpur University GM-8, VSS Nagar PO: Vani Vihar, Bhubaneswar-751 004	Member

5. Mrs.Kasturika Pattanayak — Member
Ex-Chair Person
Social Welfare Board
Govt. of Orissa
1, Lewis Road, Bhubaneswar

6. Dr.L.K.Mohapatra — Member
Ex-Vice Chancellor
No.16, Satya Nagar
Bhubaneswar-751 007

7. Dr.(Mrs.) Manorama Das — Member
C/o.Prof. G.C.Das
Santiniketana
Mathasahi, Cuttack

8. Dr.P.K.Acharya — Member
Chief Medical Officer
Capital Hospital
Bhubaneswar-751 001

9. Father Tony — Member
Principal
Loyala School, Chandrasekharpur
Bhubaneswar-751 023

10. Dr.S.K.Kar — Member-Secretary
Director, RMRC
Bhubaneswar

6.11 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 Prof. & Head, Dept. of Zoology Utkal University Vani Vihar Bhubaneswar – 751 004	Member
3.	Prof. P.C.Supkar Institute of Life Sciences Bhubaneswar-751 023	Member
4.	Fr. Abrham S.J. Director Xavier Institute of Management Bhubaneswar-751 023	Member
5.	Mr.N.R.Mansingh Inspector, SPCA C/o.CDVO office Puri – 752 002	Nominee of the CPCSEA
6.	Dr.M.K.Das DD (Sr.Gr.) RMRC, Bhubaneswar	Biological Scientist
7.	Dr. B.Ravindran I/C Animal facility DD, RMRC, Bhubaneswar	
8.	Dr.(Mrs.) N.Mohapatra Biological Scientist AD, RMRC, Bhubaneswar	
9.	Dr.S.K.Kar Director RMRC, Bhubaneswar	Convenor

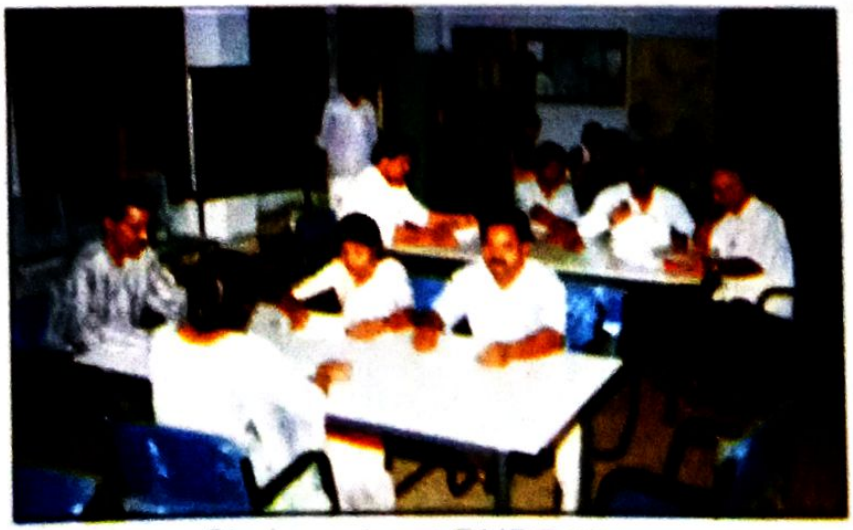
Junior Scientists at work in the Laboratory.

Incineration of Biological waste.

LIBRARY & INFORMATION SERVICES
RMRC, BHUBANESWAR

Internet services in Library.

Current Journals.



Study centre at RMRC Library.

6.12 BUDGET AND EXTRAMURAL GRANTS

The Council released Rs.245.39 lakhs for RMRC, Bhubaneswar during the year 2000-2001 as against Rs.213.5 lakhs during 1999-2000. The expenditure was Rs.113.38 lakhs for Pay & Allowances, Rs.0.66 lakhs for Pension, Rs.6.73 lakhs for T.A, and Other charges Rs.55.28 lakhs including Rs.7.53 lakhs for Library books and journals, Rs.55.28 lakhs for equipments and a special grant of Rs.1.77 lakhs for library modernisation. The extramural grants generated during the year 2000-2001 was Rs.93.12 lakhs.

6.13 ANIMAL HOUSE/INSECTARY & LIBRARY SERVICES/OPD SERVICES:

i) Animal House:

The small temporary animal facility in the Centre continues to be used for all the 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 installment of Rs.20.00 lakhs has already been deposited.

ii) Insectorium:

The insectorium 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.

iii) Library and Information Services:

RMRC library continued to provide library, information and reprographic support to the Institute's scientists as well as researchers and doctors of this region. Off - line MEDLARS services have been introduced after procurement of MEDLINE - CD from 1966 to present. INTERNET based information services are also provided to the scientists and researchers.

Interlibrary loan facilities, especially sharing the resources of Research organisations located at Bhubaneswar and Medical College, Cuttack has been further steped up by making library visit and by getting journals on loan for use of scientists of the Institute. New service have been introduced by the Library through library networking with NIN, Hydrabad Library who have procured a ProQuest Medical database by which scientist can get full text of the article from 468 biomedical journals through ProQuest Medical database.

In the library modernisation program, the Institute library is air-conditioned and furnished with good quality study Tables and Chairs. New Pentium-III computer with Internet facility, attached with Scanner have been installed for providing latest information services.

OPD on Filariasis:

An out patient department on Filariasis was opened by RMRC at Capital Hospital, Bhubaneswar in June 2001 -it was inagurated by Hon'ble Minister of State, Health and Family Welfare, Govt. of Orissa on 7th June, 2001. The OPD is run by the clinical division of this Centre every Monday and Thursday from 8 AM to 12 noon. This facility provide diagnosis and treatment of Filariasis cases, besides research. A total of around 600 cases with various grades of Oedema were treated during the year.

RMRC Web Site:

The Regional Medical Research Centre, Bhubaneswar has registered for its Web- site (**http://www.rmrcicmr.org**) and the site is under construction and will come into force shortly.

RMRC News Bulletin:

The Regional Medical Research Centre, Bhubaneswar is shortly publishing half yearly News Bulletin -the first issue is due in 2002.

Publication of Educative materials on Diseases:

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

Total Library Collections:

1.	Books:	1500
2.	Bound Journals:	1700
3.	Total Journals Subscribed:	75 (Foreign 35 and Indian 40)
4.	Reports:	500
5.	Reprints:	1000
6.	MEDLINE CD- ROM Discs 1966-2001	48

Services Provided:

1. MEDLARS Services (On- Line and Off- Line)
2. Photocopy Services
3. News Clippings
4. Inter Library Loan/ Library Networking
5. INTERNET and E-MAIL services
6. Off- Print /Reprint services

Publications of Inst. Scientists

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