ANNUAL REPORT

1995-96

REGIONAL MEDICAL RESEARCH CENTRE

(INDIAN COUNCIL OF MEDICAL RESEARCH)

BHUBANESWAR, ORISSA

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PREFACE

Major thrust of research activities of this Centre was on various facets of filariasis as per the original mandate. Basic studies were continued on the immunology of filariasis using various antigens and enzymes of cattle parasite *Setaria digitata* to understand their role in the antigenicity/ immunogenicity in different categories of filariasis patients and apparent normals (endemic normals). This Centre has achieved considerable progress in the experimental animal models of filariasis. Monoclonal antibodies have been generated to a conserved filarial antigen derived from *Setaria digitata* which is expressed in human filarial parasites also. Infective larvae of *Brugia malayi* were observed to grow upto young adult stage parasites in immuno-deficient mice (CBA/N strain). Clinical trial with ivermectin to document its role in reducing sickness due to filariasis has been completed. The project on field evaluation of *B.sphaericus* against *Cx.quinquefasciatus* is in its final stage. Existence of *Brugia malayi* infection was identified in several districts of Orissa. A study on factors responsible for continued transmission of malaria has been taken up.

Studies on sickle cell disorder and other haemoglobinopathies were taken up in Ashram schools of Sundargarh district. It is proposed to continue these studies in Mayurbhanj district also. Hospital based study on characterisation of bacterial agents for diarrhoeal disorders has been taken up. Sero-surveillance activities for the detection of HIV/AIDS in the high risk groups and in the subjects referred by health authorities are continued with the support of NACO, New Delhi. A survey was initiated to document the extent and magnitude of iodine deficiency disorders in Bargarh district of Orissa. A new study has been taken up to assess the nutritional status of vulnerable groups from Kalahandi district.

The Joint Meeting of Regional Medical Research Centres (RMRCs) of Indian Council of Medical Research (ICMR) was organised at this Centre by the Director General of ICMR during 27th-28th June 1995. The original mandates and issues related to identity crisis of centres were discussed. Filariasis and nutritional deficiency disorders were identified as specific thrust areas for this Centre. The Vector Control Research Centre (VCRC), Pondicherry and the National Institute of Nutrition (NIN), Hyderabad were identified as the networking national institutions for collaboration. Meaningful and effective linkages with local medical colleges and health departments were suggested by the Joint RMRCs Meeting. Training facilities available at various sister institutions were used to strengthen the capabilities of middle level officials. Finally, it is my pleasure to thank all our SAC members and staff of this Centre for helping me to carry out my responsibilities with a sense of fulfilment. We are grateful to Dr.G.V.Satyavati, Director General, ICMR for her valuable guidance and encouragement during the year.

Place: Bhubaneswar
Date: 26.09.1996

Dr.K.Satyanarayana
Director

STAFF POSITION AS ON MARCH 1996

DIRECTOR

DR.K.SATYANARAYANA,M.B.,B.S.,M.Sc.,Ph.D.

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Mr.R.S.Rai	Watchman
Mr.Som P. Sharma	Watchman
Mr.T.Bahadur	Watchman
Mr.R.S.Bahadur	Watchman
Mr.Sankar Bishoi	Cook-c-Guest House Attendant

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1. PARASITE IMMUNOLOGY DIVISION

1.1. IMMUNOLOGICAL INVESTIGATIONS IN HUMAN FILARIASIS USING PURIFIED ANTIGENS

Staff members : Dr.M.K.Das
Mrs.M.S.Bal
Mr.N.Mandal
Mr.H.S.Naik

1.1.1. Detergent soluble fraction of *Setaria digitata*

Immunological determinants of protective immunity in human filariasis (a concept indirectly supported by epidemiological studies) remain largely unknown. This laboratory is mainly interested to find out such parameters by analysing the immune response of endemic normals (EN), a group believed to be immune (resistant to establishment of infection) *vis-a-vis* diseased groups. In this context, our studies have indicated suppressed antibody levels to a detergent soluble antigen ($DSSd_1$) of *Setaria digitata* in asymptomatic microfilaraemic (AS) individuals. Elevated levels were observed, on the contrary, in amicrofilaraemic people. The details of this antibody response are:

1. EN sera exhibited highest IgM levels, while sera from chronic patients (CP) of filariasis with disease manifestations had highest IgG levels.
2. Antibody levels were found to be negligible in non-endemic (collected from non-filarial region) normals.
3. The prevalence (seropositivity) of $DSSd_1$ specific antibodies in filarial groups was evaluated in different groups. IgG and IgM seropositivity prevalences in

AS group were low. The prevalences of IgG and IgM isotypes in EN were high but in CP, only IgG prevalence was observed to be high. EN as a group had the highest seropositivity of prevalence for both the isotypes.

4. The pattern of IgM prevalence appears to depend on disease manifestations, low to moderate values in infected people and high values in EN. IgG prevalence tends to depend on microfilaraemic status, these antibodies were mostly detected in amicrofilaraemic EN and amicrofilaraemic CP groups.

5. The distribution of $DSSd_1$ antigen in filarial parasite is being determined. Immunoperoxidase localization experiment using rabbit anti-$DSSd_1$ antiserum showed the presence of this antigen on sheath of *Wuchereria bancrofti* microfilariae. This is of great importance as the surface proteins are known to be involved in immune elimination of microfilariae. The reduced level of $DSSd_1$ antibodies in microfilaraemic people is also in agreement with its surface localization. These preliminary studies indicate $DSSd_1$ to be a novel antigen of potential importance in filarial immunology.

1.1.2. A filarial allergen Sd_{30}

Allergic reactions constitute an important aspect of filarial infection. We have recently described a filarial allergen, which has been identified to be a cysteine protease. The allergen isolated from adult *Setaria* was designated as Fr.III or Sd_{30}.

The effect of antibodies in filarial patients on the protease activity of the allergen was studied. Chronic filarial IgG caused complete inhibition of Sd_{30} protease activity in contrast to normal human IgG.

1.1.3. Carbohydrate epitopes of excretory-secretory (ES) antigens

The role of carbohydrate epitopes of ES antigens on filarial antibody binding was investigated. Sodium periodate treatment, which destroys the carbohydrate residues of ES antigen, caused decreased antibody binding in all filarial sera other than those of asymptomatic microfilaraemic carriers (AS). It appears that antibodies in microfilaraemic individuals do not seem to recognise carbohydrate epitopes of ES antigens, whereas amicrofilaraemic individuals have antibodies to these epitopes.

1.2. ANTIGENICITY OF FILARIAL ENZYMES IN ENDEMIC POPULATION

Staff members : Dr.M.K.Das
Mrs. M.S.Bal
Mr.H.S.Naik

Enzymes like superoxide dismutase, proteases and glutathione-S-transferases play crucial functions in immunobiology of parasites. Superoxide dismutase, a prominent anti-oxidant enzyme of filarial parasites has been studied by us in details (Annual Report 1994-95).

PROTEASES:

1. Proteolytic activity was determined in different stages of parasites. Enzyme-inhibitor profiles showed the preponderance of cysteine proteases in somatic stages and serine proteases in excretory-secretory stages. In other words, serine proteases are mostly released by the parasites.
2. Filarial IgG caused inactivation of proteolytic activities in both human and cattle parasites. IgG from normal human sera had no inhibitory effect. The extent of inhibition differs among the stages of parasite indicating that the antigenicity of the proteases differs in these stages. These results provide the first evidence that neutralizing antibodies to proteases are elicited during human filarial infection.
3. IgG subclass analysis of a purified filarial protease (SdP_1) was carried out in filarial sera. Asymptomatic microfilaraemic sera exhibited selectively IgG_4 response. Chronic patients sera also had IgG_4 as the major subclass, but other subclasses were also detected in these sera. Molecular weight of the protease is being determined.

GLUTATHIONE-S-TRANSFERASE:

1. Antibody isotypic responses to affinity-purified glutathione-S-transferase (GST), an enzyme extremely important in detoxification process for the parasites, were evaluated in human filariasis. High levels of IgM and IgG, but undetectable levels of IgA and IgE antibodies were noted. The absence of the latter two isotypes in filariasis is in sharp contrast to schistosomiasis, where these isotypes play particularly important role in protective immunity. IgG level in asymptomatic microfilaraemic or chronic patient group was higher than that in endemic normals. However IgM levels do not

differ significantly among the filarial groups. Greater proportion of endemic normals are IgM than IgG positive.

2. The pattern of IgG subclass recognition to GST was evaluated. IgG_1 was detected in both microfilaraemic carriers and chronic patients, but additionally IgG_4 was also detected in microfilaraemic individuals. Thus, chronic patients recognised predominantly IgG_1, while microfilaraemic people exhibited both IgG_1 and IgG_4 subclass.

1.3. IMMUNE RESPONSE TO PARASITIC LIPIDS IN HUMAN FILARIASIS

Staff members : Dr.M.K.Das
Dr.A.K.Satapathy
Mrs.M.S.Bal
Mr.H.S.Naik

Extensive immunological studies on filariasis have been carried out using mostly protein antigens. However, lipids, an important class of natural antigens, generally do not get enough attention due to inherent difficulties in isolation, solubility and in-amenability to recombinant DNA technology. This project initiates studies on immunological reactivity of lipids from *Setaria digitata*.

1. Lipid antigens were isolated from microfilariae and adult stages of the parasite. IgG and IgM levels were determined. Elevated antibody levels were observed in amicrofilaraemic endemic normals and chronic filariasis. Asymptomatic microfilaraemic sera showed the lowest level of antibodies.
2. Periodate treatment was used to assess the contribution of carbohydrate moieties in the lipids. Periodate oxidation of both microfilariae and adult lipids resulted in decreased antibody binding in all filarial sera. The magnitude of reduction appears to vary among the groups. The results indicate that epitope (carbohydrate) recognition might be different during the progression of human filariasis.
3. Immunoperoxidase localization studies using rabbit anti-lipid antisera suggested the presence of lipid antigens on the sheath of *W.bancrofti* microfilariae.

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2. APPLIED IMMUNOLOGY DIVISION

2.1. IMMUNOLOGICAL STUDIES ON ANTIBODIES TO DIETHYLCARBAMAZINE - AN APPROACH TO DEVELOPING AN IMMUNOPROPHYLACTIC AGENT AGAINST FILARIAL PARASITE

Staff members : Dr.B.Ravindran
Ms.S.Mukhopadyaya
Mr.P.K.Sahoo

Introduction:

The existence of protective immune response in human filariasis continues to be a debatable idea, although there have been several reports of induction of protective immunity in animal models of filariasis. In general, antigens expressed in infective larvae, adults as well as microfilarial stages of the parasites have been used for induction of protective immunity under experimental condition and, in recent years, there have been a few reports on attempts to vaccinate animals using recombinant proteins. We had demonstrated earlier, antigenic mimicry between DEC and certain filarial antigens expressed on sheath of *W.bancrofti*. Since antibodies to MPCA, a derivative of DEC reacted with Mf as well as adult stages of *S.digitata*, we have been addressing the following two major issues.

a) production of polyclonal and monoclonal antibodies to DEC with a view to test their potential for passive immunization against different stages of filarial parasites in animal models, and

b) molecular identification and characterization of the filarial antigen(s) that cross-react with anti-DEC, which will lead to a broader understanding of the role of such antigens in induction of protective immune response both in animal models and in human filariasis.

PROGRESS:

a) A large glycoprotein antigen with high molecular weight that binds to wheat germ agglutinin (WGA) was affinity purified from adult extracts of *S.digitata*, using WGA-sepharose and was designated as AgW. Cris-cross reactivity and inhibition experiments by ELISA, revealed AgW to be the filarial antigen reacting with polyclonal anti-DEC raised in *Mastomys coucha*.

b) A polyclonal antibody to affinity purified AgW was raised in *M.coucha* and was found to react with Mf sheath of *W.bancrofti* as well as *S.digitata*. Antibodies to AgW could be demonstrated in human filarial sera and were inhibitable by MPCA-BSA and not by BSA.

c) Western blot analysis of *S.digitata* adult somatic antigen by probing with anti-DEC as well as WGA-peroxidase revealed similar reactivity to AgW.

d) Polyclonal anti-DEC was found to potentiate the Mf clearance by sub-therapeutic dose of DEC *in vivo* in both *B.malayi* as well as *S.digitata* microfilaraemic models (details were presented in 1994-95 Annual Report). The role of anti-DEC in inhibiting the development of L_3 in jirds and CBA/N mice is under study.

e) Monoclonal antibodies (MAbs) to MPCA-BSA were prepared by immunizing mice with affinity purified AgW and selecting clones reactive to AgW as well as to Mf sheath.

f) MAb to AgW (IgM isotype) were found to be reactive to antigen extracts from i) *S.digitata* adults, ii) *S.digitata*-ES, iii) *B.malayi* adults, iv) *B.malayi* infective larvae and also Mf sheath of *W.bancrofti*, *B.malayi* and *S.digitata* as shown by immunoperoxidase assays. The MAb to AgW (clone P1E3) was also found to be reactive to MPCA-BSA and its reactivity to filarial antigens was inhibitable by pre-incubation with DEC. Studies are in progress to investigate the role of MAb in Mf clearance, inhibition of L_3 development and potentiation of DEC activity in animal models.

2.2. STUDIES ON SERUM CYTOTOXIC FACTORS

Staff members : Dr.B. Ravindran
Mr.P.K. Sahoo

Starting date : July 1991

INTRODUCTION :

'Crisis form factors' (CFF) in malarial sera have been defined as non-antibody circulating molecules that mediate cytotoxicity to the intra-erythrocytic stage plasmodia. They induce 'crisis forms' resulting in non-development of the parasite. It has been proposed as a primary mechanism of development of acquired immunity at least in some geographical areas. The conventional merozoite inhibitory antibodies neutralize the infectivity and re-invasion of normal erythrocytes while the CFF act on the intra-erythrocytic stage parasites. The nature of CFF is largely unknown, although it is proposed to be a mixture of cytokines such as TNF-α and interferon-γ, lipid peroxidation products and a host of unknown circulating molecules. One of the characteristic features of CFF is its lack of species specificity towards its target, i.e., CFF in murine malarial sera could mediate cytotoxicity to human malarial parasite, *P.falciparum*, and *vice versa*. This is in contrast to the mode of action of anti-malarial antibodies, which show a high degree of species specificity towards homologous parasites. These observations prompted us to study the target specificity of CFF towards other parasites present in circulation.

PROGRESS :

About 50-60% sera samples collected during acute malaria were mediating cytotoxicity to microfilarial stages of *S.digitata* and *W.bancrofti* and detailed results were reported in 1994-95 Annual Report. Further studies were continued this year to identify the molecular nature of Mf cytotoxic factors in human malarial sera. Lipid peroxidation products or TNF-α or chloroquine in sera were not found to be responsible for observed cytotoxicity. Since phospholipase A2 (PLA2) inhibitor nordihydroguaiaretic acid (NDGA) appeared to inhibit Mf cytotoxicity at high concentrations, two other potent inhibitors of PLA2, namely, manoalide and retinal were tested to establish the role of PLA2 in cytotoxicity. Both the above PLA2 inhibitors were found to be cytotoxic to Mf themselves and could not be used to evaluate

the role of PLA2 in Mf cytotoxicity. Pooled human malarial sera were then passed through a column of polyvalent anti-human immunoglobulin, coupled to sepharose to affinity purify and elute immunoglobulins. All the three samples, viz., (a) cytotoxic sera (b) cytotoxic sera passed through anti-human Ig column and (c)affinity eluted immunoglobulins were tested for cytotoxicity. Nearly 75-80% of cytotoxic activity was associated with affinity eluted Ig fraction. The cytotoxicity does not appear to be mediated by antibodies to Mf since, (a) filarial sera which have very high titres of antibodies to Mf do not mediate Mf cytotoxicity and (b) there was no significant difference in antibody titres to Mf between cytotoxic and non-cytotoxic malarial sera.

2.3. IMMUNOBIOLOGICAL STUDIES IN ACUTE BANCROFTIAN FILARIASIS

Staff members : Dr.B.Ravindran
Dr.Bidyut K.Das
Mr.P.K.Sahoo

INTRODUCTION:

Acute filarial episodes in endemic areas is perceived clinically as a more challenging entity than management of chronic manifestations such as elephantiasis. It is generally believed that acute filariasis is a result of switching over from a state of immunological anergy (as seen in asymptomatic Mf carriers) to a state of immunological hyper-reactivity (as seen in elephantiasis patients). The precise immunological changes that occur during ADL have not been addressed in detail, partly because of the transient and self limiting nature of the acute disease. A clear understanding of the immune response to filarial antigens and the inflammatory process associated with ADL, are essential for clinical management of the disease and for diagnosis of some of the unusual manifestations of the disease.

PROGRESS:

(a) We demonstrated a very significant rise in TNF-α levels and their association with severity of ADL. Based on these observations, the use of TNF-α inhibitors for clinical management of acute filariasis was also suggested. The association, if any, between bacteraemia and ADL was also investigated with a view to understand the increase in TNF-α observed in ADL, since LPS or lipotechoic acid are known TNF-α inducers. There was no association between bacteraemia and TNF-α levels, indicating that

the source of stimulation for TNF-α induction in ADL could be a product of filarial parasites.

There was also a very strong association between raised levels of C-reactive protein (CRP) and severity of ADL. In asymptomatic Mf carriers and in patients with chronic filariasis, there was no increase in circulating CRP levels. Since CRP is one of the dominant acute phase proteins and its induction is up-regulated by IL-6, it is concluded that ADL is associated with an increased production of IL-6 also. This conclusion is in conformity with raised levels of TNF-α and IL-6 observed in filariasis patients after administration of DEC.

(b) Antibody responses to antigens of adult stage filarial parasites were studied in sera of patients with ADL and the titres compared with those in asymptomatic Mf carriers (AS), chronic filariasis cases (CP) and in endemic normals (EN). While anti-filarial IgG levels were not significantly different in these groups, the anti-filarial IgM was significantly high in ADL cases as compared to its titres in AS, CP and EN groups. This tends to indicate an immune response to newer and noval filarial antigens during ADL. The cause-effect relationship of this response to ADL needs to be investigated. This observation could also be used for development of an immunological test for diagnosis of atypical features associated with acute filarial episodes (commonly observed in endemic areas). Diagnosis of atypical forms of acute filariasis is often made on presumptive basis using exclusion criteria.

(c) Investigations on the possibility of a filarial antigen induced TNF-α induction were carried out. Excretory-secretory antigens of *S.digitata* were used in a D-galactosamine primed mouse model for TNF-α induction. Detailed studies indicated a possible existence of TNF-α like motif in filarial parasites, inducing mortality of D-galactosamine primed mice. This was confirmed by sandwich immunoassays using monoclonal antibodies to murine and human TNF-α. The signal in immunoassays for TNF-α like motif could be inhibited with standard recombinant TNF-α in a dose dependent manner. The biological activity of these TNF-α like molecules could also be demonstrated in bioassays using L-929 cells as targets. The bioactivity in L-929 assay could be competitively inhibited by standard anti-TNF. Confirmation of TNF-α transcription in adult filarial parasites was performed by northern hybridization using TNF-α specific nucleotide probes.

2.4. DEVELOPMENT OF A LABORATORY MODEL FOR *W.BANCROFTI*

Staff members : Dr.B.Ravindran
Dr.A.P.Dash
Ms.S.Mukhopadyaya
Mr.P.K.Sahoo
Ms.M.Mohanty

INTRODUCTION :

No laboratory animal model exists for growing the different developmental stages of the human filarial parasite *W.bancrofti*, which is the primary causative agent of nearly 90% of global prevalence of lymphatic filariasis. However, a sub-periodic strain of *B.malayi* has been successfully adapted in cats, jirds and *Mastomys coucha* and is being very widely used in many laboratories. Normal immuno-competent mice are totally resistant to *B.malayi* infection initiated by inoculation of infective larval (L_3) stages, while adults and microfilarial stages of *B.malayi* do survive in various strains of inbred mice for a reasonable period of time. Demonstration of complete susceptibility of nude and severe combined immune deficient (SCID) mice to L_3 initiated infection of *B.malayi* resulting in complete development upto Mf production in these mice have indicated that active immune response is the primary cause for the refractory nature of immuno-competent mice to *B.malayi* development. These observations have opened up possibilities for a rational approach towards development of animal models for human filarial parasites.

PROGRESS:

(a) The susceptibility of CBA/N strain of mice to Mf of *S.digitata* was tested and compared with CBA/J. While both these strains are genetically alike (H-2 K haplotype) CBA/N strain has a X-chromosome linked deficiency that results in a deficient antibody response to T-independent antigens and also partial impairment to T-dependent antigens. Peritoneal infection of a known number of *S.digitata* Mf were followed in these animals for maintenance of microfilaraemia in circulation. A much long lasting microfilaraemia was found in CBA/N as compared to CBA/J, indicating that Mf clearance is substantially dependent on antibodies to T-independent antigens. Given the fact that carbohydrates constitute most of Mf sheath, our observations are on expected lines. It is proposed to translate this unit of work with *W.bancrofti* Mf.

(b) Since nude and SCID mice support the growth of *B.malayi*, we attempted to study the response of CBA/N and CBA/J strains of mice to L_3 initiated infection of *B.malayi*. Injection of about one hundred L_3 (harvested from *A.egypti* Liverpool strain) intra-peritoneally resulted in development of a large number of juvenile adult stage parasites in CBA/N mice by 90 days post infection. Female worms measuring upto 23 mm in length and male worms measuring upto 17 mm were harvested. Further maturation of worms resulting in Mf production has not been observed so far. Attempts are underway to study the immune response (to L_3 and adult stage antigens of *B.malayi*) with reference to antibody specificities and cytokine profile in the infected mice. These studies are expected to further improve the scope of development of a mouse model for *W.bancrofti*. Attempts are also underway to use gene knock out and transgenic mice with specific immunological deficiencies that can be used for development of filarial parasites.

2.5. IMMUNOLOGICAL COMPONENTS OF ANTI-DISEASE RESPONSE IN HUMAN AND EXPERIMENTAL MALARIA

Staff members : Dr.B.Ravindran
Dr.Bidyut K.Das
Mr.P.K.Sahoo

INTRODUCTION :

Acquired immunity in human malaria in endemic areas primarily consists of development of resistance against the manifestation of clinical disease and/or anti-parasite mechanisms, that are directed towards the various stages of the parasite viz., sporozoites, exo-erythrocytic stages or the asexual intra-erythrocytic stage parasites. Much of the efforts by immunologists over the last 3-4 decades have been directed towards identification of malarial antigens and immune responses to them with reference to anti-parasite activity. Only in recent years, emphasis is being given to anti-disease immunity. The existence of anti-disease immunity in holoendemic areas is typically characterized by the presence of a large number of intra-erythrocytic stage parasite carriers without any overt clinical symptoms. Some of the malarial antigens, presumably involved in causing disease manifestations, have been recognized and have been the subject of intensive study in recent times. Our investigations were directed towards (a) characterizing toxic malarial antigens (b) quantifying immune response to such antigens in murine and human malaria and (c) demonstration of

antibodies in immune human sera that can neutralize toxic malarial antigens by monitoring induction of TNF-α as a primary response in animal models.

PROGRESS:

(a) The anti-phospholipid antibodies, particularly of IgG_1 isotype inversely correlated very significantly with circulating TNF-α levels in human cerebral malaria, based on which, a prognostic role was proposed for anti-phospholipid antibodies in human cerebral malaria. Since phospholipids were demonstrated to be the active components of malarial exo-antigen earlier, a role for anti-phospholipid antibodies in prognosis of cerebral malaria appears tenable (more details of these findings were reported in the Annual Report, 1994-95).

(b) The levels of another crucially important auto-antibody in human sera, namely, anti-α galactose antibodies (anti-gal), were assessed with reference to endemicity and severity of the disease. Sera of normal individuals from highly endemic areas (HEN) had very high levels of anti-gal [100.3±23.8 ELISA UNITS (EU)] compared to either low endemics (LEN) [39.1±17.5 EU] or non-endemic normals (NEN) [30.2±9.3 EU]. There was a rise in the anti-gal levels during the acute *P.falciparum* infection as compared to the values in NEN or LEN groups. The anti-gal levels in patients with non-complicated malaria (NCM) were found to be 76.7±23.5 EU, while in patients who survived cerebral malaria (CM-S), it was 70.4±27.2 EU and in cerebral malaria non survivors (CM-D), these levels were only 51.6±14.8 EU. If endemic normals living in high endemic areas are considered as relatively 'immune' individuals, higher levels of anti-gal in them indicates a possible protective role against *P.falciparum* infection. Lack of a significant difference between NCM and CM-S indicates an absence of protective value for anti-gal against the development of cerebral manifestations. However, lower levels of anti-gal in CM-D, compared to CN-S indicate its prognostic role.

IgG subclass typing of anti-gal revealed a disorder in sequence, with IgG_3 dominating followed by IgG_2, IgG_1 and IgG_4 in that order. There was no significant difference in levels of anti-gal IgG subclass in different groups with the exception of IgG-1, which was significantly high in HEN compared to CM-S and CM-D groups.

Anti-gal associated with circulating immune complexes (CIC) showed a four fold increase in HEN-16.2±10 EU in comparison to LEN-4.2±1.6 and NEN-4.2±2.3 EU. In NCM patients anti-gal in CIC was very low (1.5±2.4) while it was undetectable in cerebral malaria cases. Immune complex associated anti-gal was found to be predominantly of IgG-1 subclass. These findings indicate the disease modifying role for anti-gal IgG (particularly IgG-1) either in free or immune complexed form in *P.falciparum* malaria.

(c) **Establishment of TNF-alpha induction by malarial exo-antigen:** Hypersensitization of mice to TNF-α by administration of D-galactosamine was used as a model to detect TNF-α induction by heat stable malarial exo-antigen. Since contamination of lipopolysaccharide (LPS) is often a hinderance in evaluating TNF-α induction, attempts were made to neutralize LPS using soluble polymyxin-B or absorption of LPS by passing the exo-antigen through polymyxin-B-sepharose. Since both these methods were not found to be sufficient for complete removal of LPS, a method for desensitization of animals with prior administration of LPS before initiating the D-galactosamine administration was followed. This procedure was found to completely neutralize the LPS effect. Using such a system, induction of TNF-α by the malarial exo-antigen was examined.

(d) Using toxic malarial exo-antigen in D-galactosamine primed mice as a model, we have attempted to demonstrate the existence of anti-disease immunity in human malaria. A 50% ammonium sulphate precipitate from pooled endemic normals and non-endemic normals sera were prepared and LPS contamination was reduced by passing through polymyxin-B sepharose column. Passive injection of these preparations in groups of BALB/C mice followed by challenge with D-galactosamine and exo-antigen demonstrated that Ig rich fraction of HEN could completely inhibit mortality, while a similar fraction from NEN could not protect mice from death. By using affinity purified immunoglobulins from both HEN and NEN, it was further demonstrated that the passively transferred protection resides in immunoglobulins. We are currently attempting to establish the specificity of the antibodies in human serum associated with neutralization of toxic malarial exo-antigen.

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3. CLINICAL DIVISION

3.1. CLINICO-EPIDEMIOLOGICAL STUDY ON IODINE DEFICIENCY DISORDERS (IDD) IN A DISTRICT OF WESTERN ORISSA

Staff members : Dr.S.S.S. Mohapatra
Dr.G.Bulliyya
Dr.J.J.B.Geddam
Mr.S.C.Rout
Mr.T.Moharana
Mr.K.Dhal

Starting date : September 1995
Ongoing

Iodine deficiency disorders (IDD) is one of the major micronutrient disorders in the World, next to Vit-A deficiency and iron deficiency. It is estimated that more than 1.5 billion people are at risk of IDD and 686 million people are affected by goitre. About 20 million are estimated to be mentally handicapped due to this deficiency. The high risk group are women at their reproductive age and their offspring who are at a greater risk of developing irreversible mental retardation.

In India, a conservative estimate suggests that 150 million people live at risk of IDD and 2.2 million children suffer from cretinism constituting about 36 per cent of total cases in the World. The problem of IDD exists in all the states and union territories of India.

In Orissa state, very scanty information is available regarding geographical distribution, prevalence and endemicity of IDD, excepting the mention of two sample surveys conducted

by the National Goitre Survey Team of DGHS, India, which reported a prevalence rate of 30% in Sundargarh (1987) and 19% in Puri (1989).

A preliminary sample survey carried out in two blocks namely, Bhatli and Paikamal in Bargarh district of Orissa revealed a goitre prevalence varying from 7.5 to 22.8%, which is well above the cut off value of 5%, recommended by WHO to identify it as a public health problem.

OBJECTIVES OF THE STUDY

General

To study the epidemiology of IDD in Bargarh district of Western Orissa.

Specific

To estimate total goitre rate (TGR)

To examine clinical hypothyroidism

To estimate urinary iodine level of the community

To estimate neonatal chemical hypothyroidism

To estimate iodine content of water in the study area

To evaluate the community perception of IDD especially about goitre

MATERIALS, METHODS AND STUDY AREA

(a) **Study area** : Bargarh district has been identified for the study on the preliminary sample survey which showed a high TGR.

(b) **Sampling methods and sample size** : Probability proportionate to size (PPS) cluster sampling method is chosen as recommended by the joint WHO/UNICEF/ ICCIDD recommendations. A total of 30 clusters will be surveyed with 80 respondents in each cluster.

RESULTS AND DISCUSSION

Data obtained are analysed as per the recommended WHO/UNICEF/ ICCIDD grading of goitre rate. The results indicate that one cluster namely, Dhanger is having severe IDD

problem (TGR>30%); two clusters namely, Bugbuga and Lahanda having moderate IDD problem (TGR 20-30%) and three clusters have mild IDD problem (TGR>5-20). It may be highlighted that only one cluster out of the six studied was found to be normal or unaffected (TGR<5%). Thus, it is found that 5 out of 6 clusters have the IDD problem, varying from mild to severe grades.

The cretinism prevalence was found to be 0.01%, which is less than the cut off value of the WHO, i.e., 1%. The other parameters of investigation like iodine concentration in urine, serum thyroxine level and neonatal TSH concentrations are to be determined (from the samples already collected and preserved) as soon as the required laboratory facilities are set up.

From the results so far obtained, there is a clear indication that the area is having a moderate IDD problem as the TGR varied from 20 to 30 per cent in majority of clusters. However, the final figures for the district will be available only after completion of the study.

PROPOSED STUDIES IN FUTURE AND USEFULNESS OF THE STUDY

The study will provide the information on the magnitude of the problem, its geographical distribution and the populations at risk. It will also show, whether the problem is endemic or sporadic including the cause(s) of such endemicity. It will help in the demarcation of any existing endemic belt of IDD. Such information will form a baseline document on which the future control strategies, including efficient management of resources to control the problem will rest.

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4. MICROBIOLOGY DIVISION

4.1.1. HIV/AIDS IN ORISSA

Staff members	:	Dr.B.B.Pal
		Mr.H.K.Khuntia
		Mr.S.K.Mohanty (Project staff)
		Mr.S.H.Murmu (Project staff)
Starting year	:	1987
Ongoing		

The sero-surveillance for HIV infection was initiated at this Centre in 1987. The surveillance activities are supported by the National AIDS Control Organisation (NACO), New Delhi. Currently, direct surveillance activities are not advocated. The emphasis is on implementation of preventive measures and propagation of information on safer sex, utilization of safer blood products and universal sanitary safeguards. Whenever any request is made by the state government or any institution, then the screening has been carried out. Similarly, there was a request from the superintendent, Dhenkanal jail to carry out IEC activities and sero-surveillance for HIV infection among potential blood donors from jail inmates of District Jail, Dhenkanal. This year, most of the sera were from potential blood donors, jail inmates and foreign tourists who came to Orissa.

Sero-surveillance of HIV infection in Orissa

Year of examination	Total no.of sera tested	ELISA +ve	WB +ve
Upto 1993	6928	17	7
1994	297	34	33
1995	172	0	0
Total	7397	51	40*

* Out of 40 WB +ve samples, 27 were from foreigners.

This year 172 sera were tested and all the samples were found negative for HIV antibodies. Out of 172 sera, 122 were from jail-inmates, 8 from blood donors, 18 from foreign tourists and rest were from other categories. The cumulative for all the Indian and foreign samples tested so far, reached a figure of 7397. Out of these, 40 samples were found to be WB positive for HIV antibodies (seropositivity rate : 5.41/1000).

The combined figures do not represent the true picture for this region. The true picture for Indian subjects of all categories studied at this Centre stands at 1.74/1000 samples (13/7468) and is well below the national figures which is around 7/1000 samples tested. In sharp contrast to these figures, 27 samples out of 152 samples tested from foreigners had HIV 1 and HIV 2 giving a very high seropositivity rate of 177.6/1000 samples.

4.1.2. EVALUATION OF RAPID KITS FOR THE DETECTION OF HIV ANTIBODIES

Staff members : Dr. B.B.Pal
Mr. S.K.Mohanty

Starting date : August 1995

Completed : September 1995

The Director, Central Red Cross Blood Bank, Cuttack sent three rapid test kits for the detection of HIV antibodies to assess their reliability and convenience. These were referred to as Kit-A,B and C. For testing these kits this Centre used 11 standard sera with known results. This included 5 sera with positive HIV results, 6 with known negative controls. All

the three kits supplied to this Centre gave equivalent and correct results to detect the positive/negative status of standards. It was suggested that one of the test kits, i.e "Kit-A", supplied to us, could be carried out using finger prick blood sample without any processing. This test kit had practical advantage to screen blood donors for safe blood transfusion purposes at the blood banks with ease.

4.1.3. QUALITY ASSESSMENT PROGRAMME OF HIV ANTIBODY TESTING

Staff members	:	Dr. B.B.Pal Mr.H.K.Khuntia Mr.S.K.Mohanty
Starting date	:	February,1995
Completed	:	December, 1995

In accordance with the "Quality Assurance programme for HIV-antibody testing by ELISA" formulated by NACO, New Delhi, this Centre received four batches of coded samples from National HIV Reference Centre (NHIVRC), All India Institute of Medical Sciences (AIIMS), New Delhi. A total of 73 samples were received and tested by ELISA. The results from this Centre and from other centres in the country along with the original results of NHIVRC were sent by the NHIVRC, AIIMS, New Delhi for our use.

i. Positive samples: Out of 14 known positive samples, all were found positive for HIV antibodies which confirmed absence of false negativity.

ii. Negative samples: Out of 14 known negative samples 13 were found to be negative and one was observed to be false positive for HIV antibodies. Similar results were found from some other centres also. The reason could be due to differences in the types of HIV kits used for the detection of HIV antibodies.

iii. Borderline positive samples (BPL): According to ELISA kit procedure, a sample was to be declared as negative or positive and there is no provision for border line result. All 15 BPL samples were declared as negative by this Centre for HIV antibodies, like other peripheral centres.

Excepting for borderline positive samples, our results are satisfactory and this is borne out by our results in 1994. During 1994, most of the (33 out of 34) samples identified as repeated ELISA positive by this Centre were found to be Western Blot Positive at HIV Referral Centre, NICED, Calcutta. Therefore, our HIV/AIDS testing procedure would appear to stand the test of time and passed through national level quality assurance programme.

4.1.4. IEC PROGRAMME ON HIV/AIDS

A wealth of technical information (Posters in Hindi, English and Oriya; video cassettes in Hindi and English; audio cassette in Oriya) is available on HIV/AIDS at this Centre. Our Centre has been taking keen interest in IEC activities at technical and community levels. This year several IEC programmes were conducted at different places. Details are given in the Extension and Education section.

4.2. HOSPITAL-BASED STUDY ON DIARRHOEAL DISORDERS

Staff members	:	Dr.B.B.Pal Mr.C.C.Rath (upto Nov'95) Dr.M.Anuradha (from Dec'95) Mr.H.K.Khuntia
Starting date	:	August 1995
Ongoing		

Acute diarrhoeal diseases are one of the leading and major causes of morbidity and mortality in various age groups, especially in infants and preschool children in the developing countries. Diarrhoeal disorders pose a great threat in this region due to many factors. A study has been undertaken to understand the etiological agents (bacterial) of diarrhoeal disorders among the hospitalised patients.

This study is being conducted in three hospitals, *viz.*, Capital Hospital, Bhubaneswar; Municipal Hospital, Bhubaneswar; and S.B.V.P. of Pediatrics, Cuttack.

Rectal swabs were collected in the transport medium from the diarrhoeal patients and subcultured on different media. Significant colonies were picked up, tested biochemically and finally antisera test was done for confirmation. A total of 190 samples were tested. These results are given in Table-1 and Table-2. Table-1 shows that, majority of samples (102/190;53.7%) were from infants aged 0-1 yr. About 20% were from pre-school children aged 1-5 years. Out of the 190 samples tested, 38 (20%) samples had single agent and two of these samples had shown two agents. A total of 26 (13.7%) were positive for *Vibrio*, 11 (5.8%) for *Salmonella* and 3 (1.6%) for *Shigella*. Out of 38 positive samples, *V.cholerae* 01 ogawa was the highest among the three agents (Table-2).

Table-1 : Age-wise distribution of patients

Age group	Male	Female	Total
0 - 1 yr	61	41	102
1 - 5 yrs	39	16	55
6 - 14 yrs	6	7	13
> 14 yrs	10	10	20
Total	116	74	190

Table-2: Age-wise distribution of positive samples

Agents	Age groups				Total
	<1yr	1-5yrs	6-14yrs	>14yrs	
Vibrio	8	10	2	5	25
Salmonella	7*	3	1	0	11
Shigella	2	0	0	0	2
Total	17	13	3	5	38
% prevalence of pathogens	16.6	23.6	23.1	25.0	20.0

* One is infected with *V.cholerae* and the other one is infected with *Shigella dysenterae* also.

The prevalence of pathogens was seen in one-quarter of the samples screened in pre-school children (1-5 yrs) and other groups. The prevalence of bacterial pathogens was seen in only one-sixth of infants. The role of Rota virus, enteropathogenic *E.coli* and other agents was not investigated in this study. This could be the reason for the lower prevalence of identifiable pathogens observed in this limited study. The antibiogram of the isolates will be done soon. Similar type of studies will be continued both at hospital level and also from the field, as and when, there is higher incidence of diarrhoeal disorders.

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5. MEDICAL ENTOMOLOGY AND PARASITOLOGY DIVISION

5.1. PRESENT STATUS OF *BRUGIA MALAYI* AND *MANSONIOIDES* MOSQUITOES IN ORISSA

Staff members : Dr.A.P.Dash
Mr.R.K.Hazra

Starting date : September 1989

Closing date : September 1995

The present investigation reports that *B.malayi* exists in Puri, Balasore, Cuttack and Mayurbhanj districts of Orissa. Distribution of *Mansonioides* in four physiographical regions of Orissa revealed the existence of all the species of *Mansonioides* viz., *Mansonia annulifera, Ma.uniformis, Ma.indiana* and *Ma.longipalpis*. *Ma.annulifera* and *Ma.uniformis* were observed in all the physiographical regions of the state except three districts i.e. Kalahandi, Phulbani and Keonjhar. *Ma.indiana* and *Ma.longipalpis* are restricted to the coastal belt of Puri, Cuttack and Balasore districts. *Ma.annulifera* was the dominant species in Puri and Balasore districts, where active transmission of *B.malayi* is going on.

Ma.annulifera and *Ma.uniformis* were prevalent throughout the year. The per man hour density varied between 3.85 and 18.6, reaching a peak in October in case of *Ma.annulifera*, whereas, the values were from 0.61 to 21.5, with a peak in September for *Ma.uniformis*. All three developmental stages of *B.malayi* were found in wild caught *Ma.annulifera*. Infection was found only during four months i.e., February, September, October

and November in a year. The peak infection and infectivity rates were 3.86 and 0.8% respectively in the month of October.

The microfilaria rates of *B.malayi* were 5.56%, 6.70%, 5.32% and 8.82% in Puri, Balasore, Cuttack and Mayurbhanj districts respectively. Infection was found more in males than in females. The host efficiency index, risk of infection index and annual transmission index were 0.213, 0.054 and 509.98 and 0.154, 0.013 and 157 respectively in *Ma.annulifera* and *Ma.uniformis* respectively.

Development of *B.malayi* and observations on different stages of the parasites in three species of laboratory bred mosquitoes, i.e., *Ma.annulifera, Ma.uniformis* and *Ae.aegypti* (Liverpool Strain) were similar. Mature larvae were found after 12 days. Development in *Ma.annulifera* was more rapid as compared to *Ma.uniformis.*

Biting activity of *Mansonioides* was studied. *Ma.annulifera* and *Ma.uniformis* were observed to bite throughout the night. *Ma.annulifera* had two peaks in biting activity (one around 01.00 hours and the other around 04.00 hours), while *Ma.uniformis* had one peak from 18.00 to 19.00 hours. The averages of *Ma.annulifera* and *Ma.uniformis* collected per night were 53.1 and 27.4 respectively. Average biting density decreased from May to July, increased from August till October and again decreased from November to January. During November to January midnight biting activity increased with a decline in the months of April and May. More number of mosquitoes were landing indoors during winter, while it was more in outdoors during summer. In rainy season, the landing preference in indoors and outdoors remained almost similar. This phenomenon may be due to the sleeping habits of local people.

42.3% of the female mosquitoes collected during whole night collections were nulli-parous, while 26.4%, 20.5%, 9.25% and 1.55% of mosquitoes had one, two, three and four dilatations in the ovariole respectively. Both *Ma.annulifera* and *Ma.uniformis* had a preference (80.2% and 71.2%) for biting the lower portion of the human body. Percentage of *Ma.annulifera* and *Ma.uniformis* that were found biting a human bait on face, chest, arms and legs were 1.3, 6.6, 11.9 and 80.1% and 1.0, 6.3, 21.2 and 71.2% respectively. *Ma.annulifera* showed a high preference to human blood than other three species of *Mansonioides.* The anthropophilic index for *Ma.annulifera*, *Ma.uniformis*, *Ma.indiana* and *Ma.longipalpis* were 65.5%, 56.9%, 48.0% and 28.5% respectively. Hence *Ma.annulifera* is 1.35 times more efficient as a vector than *Ma.uniformis.*

The percentage of egg masses collected on three different plants in various ponds with *Pistia*, *Eichornia* and *Marsilia* were 68.75%, 9.30% and 3.26% respectively. This indicates a bias of *Mansonioides* for *Pistia* plants for egg laying.

Larval density had positive correlations with pH. When the pH was more than 7 in breeding places, the larval density was more. Larvae or egg masses were not found, where the pH was less than 7. Similarly, larvae were not found in water with high dissolved Oxygen (7.7 to 8.9 mg/L). Nitrate nitrogen content analysis indicated a positive correlation between nitrogen content and larval density, but chlorine content showed a negative correlation with *Mansonioides* breeding.

Gonotrophic cycle of *Ma.annulifera* and *Ma.uniformis* were found to be 4 to 5 days and 5 to 6 days respectively. The percentage of hatching of eggs was high in *Ma.uniformis* (98% to 99%) than in *Ma.annulifera* (95% to 97%). The mean duration of egg to adult stage was found to be 31.4, 35.3 and 39 days for *Ma.annulifera* and 29.5, 35.5 and 35 days in Ma.uniformis in summer, rainy and winter seasons respectively.

Total daily emergence rate of *Mansonioides* was found to be maximum in November (95.4%) and minimum in March (9.8%). The mean daily survival rate of *Ma.annulifera* and *Ma.uniformis* are 73.2 and 76.2% respectively. Survival rate was high from July to February with a peak in February. Fecundity decreased in successive gonotrophic cycles in *Ma.annulifera*. This species laid an average of 134, 130 and 109 eggs in 1st, 2nd and 3rd gonotrophic cycles respectively.

Susceptibility tests of adult and larvae of *Ma.annulifera* and *Ma.uniformis* to discriminating doses of various insecticides revealed that the adult and larvae were susceptible to BHC, dieldrin, malathion and K-othrin.

Parasitic mites (*Arrenurus*) were observed to infest *Ma.annulifera* and *Ma.uniformis*. They were found infesting the mosquitoes throughout the year except in December and January with a peak in July and August. *Ma.annulifera* is more parasitised than *Ma.uniformis* by *Arrenurus*. Mite infestation has decreased the parous rate of infested mosquitoes.

5.2. DEVELOPMENT OF FILARIAL PARASITES IN *AEDES AEGYPTI* LIVERPOOL STRAIN

Staff members : Dr.A.P.Dash
Dr.N.Mohapatra
Mr.S.K.Parida

Starting date : October 1991

Infection of *B.malayi* was maintained in *Mastomys coucha*. Infected *Mastomys* having circulating Mf were offered for feeding by black eyed *Aedes aegypti* Liverpool strain in successive batches throughout the year. During April, 1995 to February 1996, 38 batches of *Aedes aegypti* (8942) mosquitoes were fed. The mosquitoes were dissected on the 16th day and 10,883 number of L_3 were procured which were further used for reinfection.

5.3. STUDIES ON MOSQUITOES OF ORISSA IN RELATION TO FILARIASIS AND MALARIA/MOSQUITO REGISTRY

Staff members : Dr.A.P.Dash
Dr.N.Mohapatra
Mr.R.K.Hazra
Mr.S.K.Parida
Mr.H.K.Tripathy

Starting date : June 1992

Mosquitoes were collected from different areas of Puri district (endemic for filariasis), Mayurbhanj, Angul and Koraput districts (endemic for malaria). The species composition reveals the presence of 22 species belonging to 5 genera.

FEEDING HABITS :

Blood meals of 485 mosquitoes belonging to nine species were analysed by gel diffusion technique. The anthropophilic indices were 18.2%, 7.3%, 68.1%, 4.5%, 85%, 12.4%, 3.3%, 68.2% and 60.0% for *An.subpictus, An.vagus, Ar.theobaldi, Cx.gelidus,*

Cx.quinquefasciatus, *Cx.tritaeniorhynchus*, *Cx.vishnui*, *Ma.annulifera* and *Ma.uniformis* respectively. Apart from human blood, 0.2% of *Cx.quinquefasciatus* had avian blood.

5.4. FIELD EVALUATION OF *B.SPHAERICUS* AGAINST *CULEX QUINQUEFASCIATUS* IN ORISSA (WHO/TDR PROJECT)

Staff members : Dr.A.P.Dash
Dr.N.Mohapatra
Mr.R.K.Hazra
Mr.H.K.Tripathy

Starting date : March, 1992

This project is in its third year of intervention. The application of biocide in experimental area maintained the larval and adult density at 50% level of the comparison area, where no intervention measure was taken. The larval density in Khurdha (experimental area) varied between 9.5 and 24.0 per dip as compared to 18.8 and 57.0 in Pipili (comparison area). The adult density in Khurdha varied from 10.4 to 31.7 per man hour while the same varied from 30 to 58.3 per man hour in Pipili.

The mean man landing rate (per man per night) was 282 in Pipili, but it was 113 in Khurdha area. The mean infection and infectivity rates during the year were 1.35 and 0.25 respectively in Khurdha as compared to 6.9 and 1.84 in Pipili.

The infectivity rate which was maintained at zero level till September in Khurdha increased to 0.6% in October, while it was 1.8% in Pipili. This project also measures the impact of the biocide on transmission indices like risk of infection index and annual transmission index, which were 0.02 and 244 respectively in Khurdha as compared to 1.2 and 16,490 in Pipili. The indices in the experimental area are very low (only fractions: 1/60 and 1/67), as compared to the values in comparison area.

5.5. EFFECT OF APHID EXTRACTS AND SOME INSECTICIDAL COMPOUNDS ON THE DEVELOPMENT OF MOSQUITOES

Staff members : Dr.A.P.Dash
Ms.R.Mohapatra

Starting date : October 1992

With the development of widespread insecticide resistance in mosquitoes, vector control programmes are facing serious problems. Hence, arises the need to search for new compounds with insecticidal activity which would effectively control the resistant vectors. This search has led to the discovery of new groups of compounds such as insect growth regulators (IGRs), synthetic pyrethroids and organophosphate compounds. IGRs exhibit a range of effects on the target species, e.g., ovicidal effect, delayed development in larvae and pupae, morphological aberrations and inhibition of adult emergence, etc. Similarly, synthetic pyrethroids have proved to be highly effective, less toxic and comparatively safer compounds for the use against mosquitoes. Organophosphate compounds are known to have insecticidal properties.

Therefore, in this study, comparative potentials of the above three groups of insecticides along with natural juvenile hormone (JH) extracted from aphids, have been elucidated to evaluate their biological activities against three vector mosquitoes of Orissa viz., *Anopheles stephensi, Aedes aegypti* and *Culex quinquefasciatus*. The insecticidal compounds tested are:

OMS 3031	-	A chitin synthesis inhibitor (IGR)
OMS 2013 and OMS 2012	-	Synthetic pyrethroids
OMS 3040	-	Organophosphate compound
TAEac	-	Natural juvenile hormone

Effects of these compounds on the percentage of hatching (ovicidal effect), emergence inhibition, sex ratio and fecundity and fertility rates were determined.

OVICIDAL EFFECT

At EC_{50}, none of the test compounds and at EC_{90} OMS 3031 have significantly reduced the percentage of hatching ($P < 0.001$), while OMS 2013, OMS 2012 and OMS 3040 have completely checked the hatching of *Ae.aegypti* eggs. In case of *An.stephensi*, EC_{50} dose of TAEac and OMS 2012 have no adverse effect on the percentage of hatching, while both EC_{50} and EC_{90} of TAEac caused maximum level of reduction in the hatching percentage. The EC_{90} dose of OMS 2012 and both EC_{50} and EC_{90} dose of OMS 3040 have completely stopped the hatching. The present study also indicates that the eggs of *Cx.quinquefasciatus* are not sensitive to EC_{50} dose of any of the test compounds and with the rise of the dose to EC_{90} only OMS 2012 has caused cessation of hatching. From the results it is apparent that the sublethal dose (EC_{50}) of OMS 3031, OMS 2013 and OMS 3040 have ovicidal effect only on *An.stephensi*. The EC_{90} dose of OMS 2012 and OMS 2013 showed ovicidal effect on *An.stephensi*, *Ae.aegypti* and *Cx.quinquefasciatus*, while that of OMS 3031 and OMS 3040 on *An.stephensi* and *Ae.aegypti* and TAEac only on *An.stephensi*.

EMERGENCE INHIBITION

The percentages of emergence inhibition of the three species of mosquitoes at EC_{50} dose of all the compounds in decreasing order of efficacy are as follows:

An.stephensi	OMS 3040>TAEac>OMS 2013>OMS 3031>OMS 2012
Ae.aegypti	TAEac>OMS 3040>OMS 3031>OMS 2013>OMS 2012
Cx.quinquefasciatus	TAEac>OMS2012>OMS 3031>OMS 2013>OMS 3040

The emergence of adult mosquitoes was completely inhibited with the EC_{90} dose for all the studied compounds, including aphid extracts.

5.6. RISK FACTORS FOR PERSISTENCE MALARIA TRANSMISSION IN FOUR GEO-PHYSIOGRAPHICAL REGIONS OF ORISSA IN COMPARISON WITH BORDERING AREA

Staff members : Dr.A.P.Dash
Dr.N.Mohapatra
Mr.S.K.Parida
Mr.R.K.Hazra

Starting date : July 1995

Entomological and parasitological studies were initiated in four geo-physiographical regions of Orissa i.e., Badampahad of Northern plateau, Madhpur of central table-land, Balugaon of coastal tract and Baipariguda of Eastern ghat regions.

Seventeen species of mosquitoes belonging to 3 genera were encountered during the survey. The known vector species encountered were *An.fluviatilis*, *An.culicifacies*, *An.annulifera* and *An.varuna*. *An.fluviatilis*, the important vector species was found to be susceptible to Malathion and K-othrine. Around 149 blood slides were collected from the four geo-physiographical regions. Except coastal tract, the other three regions were positive for *P.falciparum*.

5.7. CYCLIC COLONIES IN THE INSECTARY

Cyclic colonies of the following mosquito species are being maintained in our insectary.

1. *Aedes aegypti*
2. *Culex quinquefasciatus*
3. *Anopheles stephensi*

The eggs and larvae of above species were used for laboratory evaluation of different insect growth regulators (IGR), plant extracts, etc. Laboratory bred mosquitoes and larvae were supplied to different research workers. Mosquitoes were also used for developing filarial larvae through membrane feeding.

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6. PATHOLOGY DIVISION

6.1. DEVELOPMENT OF L_3 FROM Mf OF *WUCHERERIA BANCROFTI* IN *AEDES AEGYPTI*

Staff members : Dr.M.R.Ranjit
Dr.A.P.Dash
Mr.B.N.Sethi
Mr.K.C.Dalai

6.1.1. Field study for carrier blood

For providing Mf carrier blood to the *Aedes aegypti* (Liverpool strain) and *Culex quinquefasciatus*, a cross sectional night blood survey was conducted in Jagulipatna village (35 kms South of Bhubaneswar). A total of 362 individuals belonging to various age groups (1-70 years) were screened for the purpose. The Mf positivity and disease positivity rates were found to be 19.1% and 7.2% respectively.

During the survey, a field level IEC programme was also arranged to make the people aware of preventive measures for filariasis and to select Mf carrier volunteers to donate blood for the experiment.

6.1.2. Infection of mosquitoes and harvesting of infective larvae

Non-availability of infective stages (L_3) of *W.bancrofti* parasite in adequate numbers is one of the limitations in the experimental parasitology work. 2.5 ml of blood collected in heparin from 4 Mf carriers (60-80 mf/20 µl of blood) in separate vials were fed to 200 adult mosquitoes each of two species *Aedes aegypti* (Liverpool strain) and *Culex quinquefasciatus*. The blood meal was offered through artificial membrane feeding for 7 hours as per their

feeding habits. The mosquitoes were dissected after 16 days to look for the development of L_3 from Mf and to recover L_3 for experimental induction of infection in animal models. From the observations, it was found that the *Aedes aegypti* (Liverpool strain) was more susceptible to *W.bancrofti*, infection rate being 90% in this species as compared to 42.8% in *Culex quinquefasciatus*.

JUSTIFICATION FOR CONTINUATION OF THE STUDY:

Having established the membrane feeding technique and *Aedes aegypti* (Liverpool strain) as a successful intermediate vector for *W.bancrofti*, it will now be possible to obtain greater numbers of L_3 for experimental purposes to attempt induction of artificial infection in different groups of immunomodulated rodents.

6.2. DIAGNOSTIC SERVICES

The Pathology Division of RMRC, Bhubaneswar extended its diagnostic services to the patients referred from local Capital Hospital and its peripheral health centres, SCB Medical College, Cuttack; NALCO Hospital, Anugul on haematological and biochemical investigations. The total samples tested for various investigations during the period under report are as follows.

1.	Full haematological investigations	:	320
2.	Biochemical estimations	:	167
3.	Stool/Urine	:	198

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7. HUMAN GENETICS DIVISION

7.1. DISTRIBUTION OF HAEMOGLOBINOPATHY, G6PD DEFICIENCY AND BLOOD GROUPS IN SOME SELECTED TRIBAL POPULATIONS OF ORISSA

Staff members : Dr.R.S.Balgir
Dr.B.P.Dash
Mr.B.Murmu
Mr.R.N.Nayak

Starting date : April 1995

OBJECTIVES

i. To study the distribution of abnormal haemoglobins, G6PD deficiency and some blood groups among the major tribal groups.

ii. To look for some rare and abnormal genetic characters of clinical importance, and

iii. To suggest the best preventive and intervention measures.

INTRODUCTION

The Ashram schools in the state of Orissa are financially supported by the Government and are under the administrative control and care of District Welfare Officer. These Schools are generally located in the tribal areas. Each Ashram school has the 90% strength of scheduled tribes and 10% of scheduled caste of that area. District-wise data on Ashram schools and strength of students in the state of Orissa were collected to plan and carry out

the study. Since the Ashram schools represent the local tribal and scheduled caste population,they could very well represent the major groups of the locality. Therefore, it was decided to carry out the study in Ashram schools in Sundargarh district of Orissa.

For the present study, seven Ashram schools were selected at random representing different geographically scattered locations in Sundargarh district of Orissa (Table-1). A total of 575 Ashram School children aged 6-15 years, were screened for haemoglobinopathy, G6PD deficiency and ABO and Rh blood groups. The following groups were included in the study, scheduled tribes: Bhuyan (92), Kharia (54), Kissan (130), Munda (96), Oraon (104), Gond (14) and scheduled castes: Pan (44) and Ganda (12) and mixed groups (29). About 2-3 ml. intravenous blood samples were collected from each individual into EDTA coated vials. Sickling test and blood groups typing were done in the field and the rest of the blood samples were transported under ice-cold conditions to the laboratory at RMRC, Bhubaneswar within 24 hours of collection and were analysed using standard procedures.

Table 1 : Ashram schools studied in Sundargarh district, Orissa

Sl.No.	Name of place	No. of students covered
1	Aleikera	131
2	Bargad	56
3	Chhatasaragi	99
4	Tudalaga	12
5	Katang	93
6	Budhabhuin	112
7	Badposh	72
	Total	575

The sickle cell haemoglobinopathy was detected in trait (HbAS) form in Munda (3.1%), Kharia (7.4%) and Gond (14.2%) tribals only. No case of sickle cell disorders was recorded in Bhuyan, Kissan and Oraon tribals. However, among the scheduled caste Ganda, six persons out of 12 had sickle cell trait. There were 13 sickle cell trait cases and 4 homozygous sickle cell disease cases detected among 44 Pan scheduled caste persons of Sundargarh

district (Table-2). This indicates that both the scheduled caste and tribal populations of Sundargarh district of Orissa are affected with sickle cell haemoglobinopathy.

Table 2: Distribution of sickle cell disorders and thalassaemia in different scheduled castes (SC) and scheduled tribes (ST) of Sundargarh district, Orissa

Groups	No. tested	Sickle cell trait		Sickle cell disease		Beta-thalassaemia trait	
		No.	%	No.	%	No.	%
Bhuyan(ST)	92	0	0.0	0	0.0	0	0.0
Kharia (ST)	54	4	7.4	0	0.0	1	1.9
Kissan (ST)	130	0	0.0	0	0.0	2	1.5
Munda (ST)	96	3	3.1	0	0.0	5	5.2
Oraon (ST)	104	0	0.0	0	0.0	2	1.9
Gond (ST)	14$	2	14.2	0	0.0	0	0.0
Pan (SC)	44$	13	29.5	4	9.0	0	0.0
Ganda (SC)	12$	6	50.0	0	0.0	0	0.0
Others (mixed)	29$	4	13.8	0	0.0	0	0.0
Total	575	32	5.6	4	0.7	10	1.7

$ Small sample size

The prevalence of glucose-6-phosphate dehydrogenase (G6PD) deficiency is considerably high among the tribals of Sundargarh district. The G6PD deficiency was recorded in Munda (15.9%), Kharia (14.2%), Bhuyan (12.9%), Oraon (8.2%) and Kissan (5.1%) in the decreasing order (Table-3). This shows that the antimalarial drugs should be administered with caution in this district as these drugs may cause haemolytic anaemia, sometimes fatal also, in the G6PD deficient subjects.

Table 3: Distribution of glucose-6-phosphate dehydrogenase (G6PD) deficiency in different scheduled castes (SC) and scheduled tribes (ST) of Sundargarh district, Orissa

Groups	No. tested	G6PD Deficient			
		Males	Females	Total	
		No.	No.	No.	%
Bhuyan (ST)	54	5	2	7	12.9
Kharia (ST)	35$	1	4*	5	14.2
Kissan (ST)	98	3	2**	5	5.1
Munda (ST)	88	11	3	14	15.9
Oraon (ST)	73	5	1	6	8.2
Gond (ST)	14$	0	0	0	0.0
Pan (SC)	12$	2	0	2	16.6
Ganda (SC)	12$	0	0	0	0.0
Others(mixed)	14$	0	0	0	0.0
Total	400	27	12	39	9.7

* includes three homozygous and one heterozygous case

** includes one homozygous and one heterozygous case

$ small sample size

The distribution of ABO and Rh blood groups shows the preponderance of B blood group over A and low incidence of Rhesus negative (1%) among the tribals of Orissa. Among the Pan scheduled caste, the frequency of blood group O is also double (59.1%) than the combined frequency of A (6.8%) and B (20.5%) blood groups. Similarly, a high frequency of blood group O has been observed among the Ganda (41.7%) scheduled caste. The highest frequency of blood group AB has been observed in Gond (14.2%), followed by Pan (13.6%), Oraon 12.5%), Munda (10.4%) and so on.

Haemoglobin was estimated and the prevalence of different grades of anaemia was studied in different groups. Out of 573 children studied, 0.7% had severe anaemia (Hb<7.0

gm/dl), 12.0% moderate anaemia (Hb 7.1-10.0 gm/dl), 61.8% mild anaemia (Hb 10.1-12.0 gm/dl) and 25.5% had normal haemoglobin level (Hb>12.0 gm/dl). Mild to moderate anaemia exists in nearly three-fourth of the tribal school children screened. This problem is not a specific health problem of the tribals only, general rural population of Orissa is also equally vulnerable to this health problem.

7.2. SCREENING CAMP ORGANISED AT DISTRICT HEADQUARTERS HOSPITAL, SUNDARGARH

A free screening camp was organised at the District Headquarters Hospital, Sundargarh. The aims of the camp were:

i. To screen the suspected cases of sickle cell disorders.

ii. To make the people aware of the major genetic and public health problems.

iii. To offer genetic/marriage counselling to the affected persons for preventive measures.

With these aims and objectives in mind, a camp was organised during 14th-15th February 1996 in Sundargarh. Prior to holding the camp, it was duly discussed with the Chief District Medical Officer, Sundargarh and he was requested to widely publicise through Medical Officers and other paramedical staff. The response was very good. During the camp, 111 persons were screened for haemoglobinopathy. Out of 111 persons, 49 sickle cell trait cases and 24 homozygous sickle cell disease cases and one case of beta-thalassaemia major were detected. The majority of persons attending this camp happened to be self-selected patients and their family members. For this reason, only 37 out of 111 persons (33.3%) had normal haemoglobin. A total of 65 persons belonged to general castes and among these 34 had sickle cell trait, 14 had sickle cell disease and 2 had G6PD deficiency. Agharia caste dominated the general castes and only 5 out of 28 had normal haemoglobin type. A total of 28 persons belonged to scheduled tribes and among them 8 had sickle cell trait, 7 had sickle cell disease, 3 had G6PD deficiency and one had beta-thalassaemia major. Necessary genetic/marriage counselling was given to affected families with management measures.

7.3. COLLABORATION WITH PROF. P.P.MAJUMDER, INDIAN STATISTICAL INSTITUTE, CALCUTTA

In the month of March 1996, some of the families of identified cases of the camp were revisited. Detailed information was recorded and blood samples were collected for molecular analysis at the Indian Statistical Institute, Calcutta. The processing of the samples is in progress.

7.4. REFERRAL SERVICES

During the 1995-96 year, 31 cases were referred from different hospitals, PHCs or dispensaries to the Division of Human Genetics. Diagnostic facilities were provided alongwith the genetic/marriage counselling and management advice to patients and to their parents/ relatives. Out of 31 cases, 16 (51.6%) were diagnosed as sickle cell trait, 7 (22.5%) as sickle cell disease, 2 (6.5%) as sickle cell beta-thalassaemia and 2 (6.4%) as beta-thalassaemia major cases.

7.5. ANTHROPOMETRY AND NUTRITION SECTION

Staff members : Mr.A.Mohapatra
Mr.N.S.Marai
Ms.G.Mallick

7.5.1. Studies on school children

Studies have been continued to collect data on growth and development of school children in different schools in and around Bhubaneswar representing urban, semi-urban and rural areas. Data have been collected on height, weight, arm circumference, skin fold thickness at triceps and clinical nutritional status on about 4,000 school children at the beginning of this study. About 3,100 school students were re-examined after 6 months and 12 months for growth and development pattern of school age children in this region. About 900 urban school students could not be studied in the second visit due to pressure of examinations for these children. This group will be covered at 18 months after initial registration. The data on height, weight and percentage values with reference standards have been computerised and were re-checked for validation. The analysis part is being taken up currently. This study is expected to provide data on the status of Bhubaneswar school children in relation to children from other parts of India. It is also expected to provide information on annual increments of height and weight of different school age group children from this region.

Initial clinical examination revealed the following results. Students from urban schools were observed to suffer from dental caries in higher proportion (10.1%). Greater proportion of semi-urban school children suffered from severe degree of anaemia compared to rural children and urban children. In a separate study it is also noticed that the prevalence of intestinal parasites was high among semi-urban school children (64-77%), whereas, the prevalence in urban children and rural children was found to be around 40%. Vitamin-A deficiency signs were also seen in a greater proportion (15.3%) of semi urban children. On the other hand higher proportion (19.7%) of rural children showed B-complex deficiency signs, compared to urban and semi-urban students.

7.5.2. STUDIES ON NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN AND WOMEN

Staff members : Mr.A.Mohapatra
Dr.J.J.B.Geddam
Mr.N.S.Marai
Mr.B.Murmu

A survey of pre-school children and mothers carried out last year in Gania panchayat samithi, revealed a changing profile of nutritional status of certain areas in Orissa. Kalahandi district of Orissa (old district) is known for its alleged reports on semi-starvation related mortality from time to time. Scientific data base available is not adequate to assess the real picture of nutritional status of vulnerable groups in this deprived area of this region. The district headquarters was visited by a team of RMRC scientists to obtain particulars of population. Gram Panchayats (GPs) were selected as the basic units and cumulative frequency of population was prepared, by including all GPs and towns. From the total GPs and towns, 15 clusters were selected randomly after obtaining class interval and a random number to spot these units. These GPs and towns which were selected on population proportionate sample (PPS) technique will be the clusters to select 50-60 children below 5 years and 50-60 women aged 20-45 years. It is proposed to cover 600 children (0-5 years) and 500 women (20-45 years) from the 15 clusters for assessment of nutritional status.

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8. MALARIOLOGY DIVISION

Staff members : Dr.R.C.Sharma
Mr.R.K.Das
Mr.D.P.Hansdah

8.1. COLLECTION AND ANALYSIS OF SECONDARY DATA AT PHC LEVEL ON THE EPIDEMIOLOGY OF MALARIA AND DRUG DISTRIBUTION SYSTEM

Epidemiological data on malaria at primary health centre (PHC) level including data on Drug Distribution Centres (DDCs), Fever Treatment Depots (FTDs) and malaria clinics have been collected. The data have been cross checked and updated. Epidemiological and parasitological data on malaria prevalence in the state of Orissa were collected from the office of the Joint Director (malaria and filaria), Directorate of Health Services, Government of Orissa, Bhubaneswar in 1994. Details available at the level of PHC on total population, blood smears collected (BSC), blood smears examined (BSE), slide positivity rate (SPR) for malarial parasite, slide positivity rate for *P.falciparum* and the number of deaths related to malaria in each year were collected for all the PHCs in Orissa for the period between 1978-1994. The above secondary data from the DHS's office were collected for 314 PHCs of 13 old districts of Orissa (reconstituted as 30 new districts) for the 16 years period between 1978 and 1994. These data are being looked into in order to prepare new projects for better understanding of micro-epidemiological regions in the state of Orissa. Data at PHC level on about 265 PHCs on DDCs, FTDs and malaria clinics were also collected.

Secondary data thus obtained from the office of Directorate of Health Services, Government of Orissa on epidemiological, parasitological parameters and drug distribution system related to the history of malaria in the state of Orissa have been taken up for processing, interpretation and preparation of reports. Data collected on 150 PHCs out of 265 PHCs on drug distribution system were computerised and are being analysed.

Assistance was extended to the Department of Health and Family Welfare, Government of Orissa in preparation of a document on strengthening of secondary level health services in Orissa for the World Bank assistance.

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9. BIOSTATISTICS DIVISION

Staff members : Mr.Anil Kumar
Mr.P.K.Jangid

9.1. EPIDEMIOLOGY OF FILARIASIS TRANSMISSION: SOME FINDINGS

In continuation of earlier works, further exploratory work on studying the risk factors of filarial transmission suggests that the households having kuccha structure with cattle shed attached to living unit, having room density >2 persons and located close to water logging places have 78.2% higher risk of filariasis transmission to its living members than those who live in pucka houses without attached cattle shed or cattle shed located away from residential unit, no waterlogging places within 100 meter distance and upto room density of 2 persons. The attributable risk has been found to be highest due to cattle shed attached to living unit. The prevalence rate ratio found to increase sharply with the decreasing quality of living index.

In an another study where infectivity index was estimated in vectors using Mf frequency data, it was found that the estimated values of infectivity index correlate very well ($r=0.735$, $p<.05$) with the observed infection rate in wild caught mosquitoes.

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10. EPIDEMIOLOGY AND INFORMATICS DIVISION

Staff members : Dr.K.Nagaraj
Dr.B.V.Babu
Dr. D. Das
Mr.A.S.Acharya

10.1. NEW STUDIES INITIATED AND PROJECTS PREPARED

The staff of this Division were involved in the organization of Education and Extension activities in connection with 85th Anniversary Celebrations of the ICMR. Identification of institutions, correspondence with heads of the institutions, fixation and planning of programmes have been taken up by the staff of this Division. The details of programmes are given under extension and education activities of the Centre (in Section 11).

Relevant information was collected and literature search was made to prepare projects on communicable diseases like tuberculosis (TB) and leprosy. Rapport has been established with concerned state government authorities which is necessary for the preparation and execution of projects that are centred around understanding of current status of control programmes in this region. Discussions were held with various officials regarding the preparation of the project on "Evaluation of health services of leprosy under National Leprosy Eradication Programme in selected districts of Orissa". During the course of workshop for Medical Officers of leprosy eradication unit, Khurda, organized by the state government with the help of an NGO at RMRC, Bhubaneswar, various aspects of this project were discussed and finalised.

The Medical Officer, Leprosy Control Unit, Khurda alongwith the Director, RMRC, Bhubaneswar and staff of this Division participated in the standardization of schedule for interviewing leprosy patients who are under treatment. Interviews were conducted on ten leprosy patients and the relevant information was obtained from the records of Leprosy Control Unit, Khurda. A project to obtain data on 200 patients is being proposed for the current year.

Rapport was also established with authorities of TB hospitals, namely, B.M.Swasthya Niwas, Chandpur, Orissa and Government Institute of Chest and Communicable Diseases, Visakhapatnam, Andhra Pradesh. The Joint Director (TB), Directorate of Health Services, Government of Orissa and District TB Control Officer, Visakhapatnam were contacted and discussions were held for the preparation of a project entitled "Tuberculosis: A study on health care system and poor compliance of patients" to evaluate the services available for TB patients and the perceptions of patients as well as health care system managers and workers at different levels. About 200 patients will be traced to their addresses and will be interviewed to obtain the status of TB control programme as felt by the patients as well as the health care system and to trace the reasons for poor compliance of treatment by TB patients. A project has been prepared with the above objectives to evaluate the health care system with regard to TB control.

10.2. COMPUTER SERVICES TO VARIOUS SCIENTISTS/DIVISIONS OF THE CENTRE

Staff member : Mr.A.S.Acharya

Services have been provided to the scientific staff to prepare project proposals, research papers, slides, graphs, tables, creation of data bases and analysis of data. Besides regular help for day to day scientific activities of different scientists, help was extended to handle data base of the projects.

The SAC recommended multiple regression analysis of meteorological, entomological and parasitological parameters *B.sphaericus* project (WHO/TDR). Assistance was rendered for analysis and modelling of *B.sphaericus* data which is being carried out under the supervision of Dr.A.P.Dash in collaboration with University of Poona, Pune. A computer database for entomological parasitological, environmental parameters has been prepared. Mr.A.S.Acharya visited Pune University along with Dr.A.P.Dash for training and modelling

of *B.sphaericus* project data during 11th-15th July 1995. He has participated in the meeting on the application of mathematical and statistical techniques including use of ecological and transmission models to study the effect of *B.sphaericus* on *Cx.quinquefasciatus*.

Mr.A.S.Acharya has developed a computer programme (published in Computer Programmes and Methods in Biomedicine, an Elsevier publication) for calculation of LD_{50} and LD_{90} which is of immense help to researchers of this Centre. With this programme, results from different projects have been analyzed. Assistance was provided in creation of data base for the project on nutritional studies among school children. Apart from the above activities, active assistance was rendered in the preparation of various documents of this Centre. Maintenance, management and supervision of computers hardware and software and help in maintaining EPABX system and E-Mail and access through NICNET were also undertaken by him.

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11. EXTENSION AND EDUCATION ACTIVITIES

HEALTH AWARENESS PROGRAMMES IN CONNECTION WITH 85TH ANNIVERSARY CELEBRATIONS OF ICMR

This Centre has undertaken several health education campaigns in different situations regarding the contributions of Indian Council of Medical Research and its institutions in connection with **"85th Anniversary Celebrations of ICMR"**. The Division of Epidemiology and Informatics has taken a major role in organising and conducting these activities.

11.1. HEALTH AWARENESS CAMPAIGN ON NUTRITION AND HIV/AIDS AT REGIONAL COLLEGE OF EDUCATION, BHUBANESWAR AND DHENKANAL JAIL

A health awareness programme was carried out at Regional College of Education, Bhubaneswar for about 100 intermediate students and teachers on 12th December 1995. This was organised as soon as the folders were received from National Institute of Nutrition, Hyderabad. Lecture-cum-discussion programme was conducted on "Health and Nutrition" and "HIV/AIDS". The video cassette on HIV/AIDS purchased from AIIMS, New Delhi was screened. A video cassette from NIN was also screened covering two topics of nutrition. A team of seven members consisting of Dr.K.Satyanarayana, Director, Dr.K.Nagaraj, SRO, Mr.A.Mohapatra, RO, Dr.B.B.Pal, RO, Ms.R.Mohapatra, SRF, Mr.P.K.Sahoo, RA and other technical staff participated in this programme.

Another programme relates to IEC session on HIV/AIDS conducted by Dr.B.B.Pal, RO for Jail inmates of Dhenkanal on 14th and 15th December 1995. This programme was followed by the screening of about 120 voluntary blood donors for HIV/AIDS. All the volunteers from Dhenkanal Jail (both jail inmates and staff) were found to be negative for HIV antibodies. The details of this programme are covered in the section on microbiology (4.1.1).

An awareness and training programme on HIV/AIDS was arranged at RMRC, Bhubaneswar for different NGOs of Orissa, with the coordination of PAAD, Bhubaneswar. About twenty volunteers were sensitised by Dr.B.B.Pal, RO and other colleagues through lectures and demonstration of posters. Lastly, ELISA test for the detection of HIV was demonstrated to inculcate the technical spirit among the participants.

11.2. ORGANISATION OF A SYMPOSIUM ON MALARIA DURING 71ST ALL INDIA MEDICAL CONFERENCE, ORGANISED BY THE INDIAN MEDICAL ASSOCIATION

This Centre participated actively in the 71st All India Medical Conference,organised by the Indian Medical Association which was held during 27th-30th December 1995 at Rabindra Mandap and Utkal Sangeeta Mahavidyalaya, Bhubaneswar. A symposium on malaria was organized on 30th December 1995 with Dr.K.Satyanarayana, Director, RMRC, Bhubaneswar as the Chairperson. Dr.Eric Goon, Director, Human Resource Development, WHO, Geneva was the Co-Chairperson for this symposium. Six speakers drawn from various disciplines presented recent information on the epidemiology, clinical profile and management of malaria and cerebral malaria and the recent developments in the field of malaria vaccine. Two speakers were from RMRC, Bhubaneswar and two speakers each were from Ispat General Hospital, Rourkela and SCB Medical College, Cuttack. Dr.A.P.Dash, AD, presented an epidemiological picture and global strategy for the control of malaria. Dr.B.K.Das, Honourary Research Fellow presented information on the recent developments in the immunology and immunoprophylaxis of malaria. This symposium highlighted the need for collection of appropriate information to be used at the right place, at the right time and with optimal use of resources.

11.3. HEALTH AWARENESS PROGRAMME AT SAINIK SCHOOL, BHUBANESWAR

In connection with celebrations of 85th year of Indian Council of Medical Research, the R.M.R.C., Bhubaneswar organised a health awareness programme at Sainik School, Bhubaneswar on 27th December 1995. Com.Vasudevan, Principal, Sainik School welcomed the RMRC group to the programme. About 80 students of XI and XII classes and teachers of Sainik School, Bhubaneswar participated in this awareness programme.

Posters on HIV/AIDS prepared by RMRC, Bhubaneswar and those sent by NARI, Pune were displayed, half an hour before the programme for the benefit of the students and

teachers. Folders on various topics of nutrition were distributed to students and teachers. This was followed by a twenty minute talk on "Better diet for better health" by Dr.K.Satyanarayana, Director, RMRC, Bhubaneswar using overhead projection sheets on nutrient needs, food groups, planning of diet and other topics. Dr.B.B.Pal, RO, gave a ten minute lecture on HIV/AIDS using transparencies. He had outlined the routes of transmission, spread of the disease and prevention of the disease. A question and answer session, followed for about 10 minutes, where RMRC faculty consisting of Dr.K.Satyanarayana, Director, Dr.K.Nagaraj, SRO, Dr.B.V.Babu, SRO, Dr.B.B.Pal, RO and Dr.J.J.B.Geddam, RO answered questions.

This was followed by screening of video cassettes on 'Nutrition' and HIV/AIDS. The cassette on HIV/AIDS purchased from AIIMS, New Delhi was screened to the teachers and students. The awareness programme was concluded with a vote of thanks by Dr.K.Nagaraj, SRO who had organised this programme. This programme has technical support from Mr.P.K.Sahoo, RA and other staff members.

11.4. HEALTH AWARENESS PROGRAMMES FOR STUDENTS AND TEACHERS OF ZONAL ACTIVITY CAMP

A health awareness programme was conducted on 6th January 1996, for the participants of zonal activity camp of Orissa Bigyan Academy held at Tirumala Tirupati Devasthanam Kalyana Mandapam in Bhubaneswar. This programme was conducted at the request of Dr.N.B.K. Chowdhury, Secretary, Orissa Bigyan Academy. The theme of the programme was Nutrition and HIV/AIDS. The programme was organized as part of 85th Anniversary Celebrations of ICMR.

Dr.K.Satyanarayana, Director, RMRC, Bhubaneswar gave a lecture on "Nutrition and Health". Later Dr.K.Nagaraj, SRO and Dr.B.B.Pal, RO spoke on different aspects of HIV/AIDS. This was followed by screening of two video cassettes, one on nutrition prepared by NIN, Hyderabad and the other on AIDS prepared by AIIMS, New Delhi. The programme lasted for two hours. The audience consisted of about 100 students and guide teachers. There was active participation from the students in the form of discussion on various issues related to the topics. This programme was organised with the help of other staff members including Dr.B.V.Babu, SRO, Dr.G.Bulliyya, RO, Mr.P.K.Sahoo, RA and others.

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11.4. HEALTH AWARENESS PROGRAMMES FOR STUDENTS AND TEACHERS OF ZONAL ACTIVITY CAMP

A health awareness programme was conducted on 6th January 1996, for the participants of zonal activity camp of Orissa Bigyan Academy held at Tirumala Tirupati Devasthanam Kalyana Mandapam in Bhubaneswar. This programme was conducted at the request of Dr.N.B.K. Chowdhury, Secretary, Orissa Bigyan Academy. The theme of the programme was Nutrition and HIV/AIDS. The programme was organized as part of 85th Anniversary Celebrations of ICMR.

11.5. HEALTH AWARENESS PROGRAMME AND CME PROGRAMME AT ROURKELA STEEL PLANT (RSP)

Dr.Basudeb Dash, Director, Medical and Health Services, Ispat General Hospital (IGH), Rourkela had sent an invitation to RMRC to take up a CME programme on "Health and Nutrition" for the members of Indian Association of Occupational Health (IAOH), Orissa Branch through Dr.B.S.Jena, Senior Consultant (Internal Medicine), IGH, Rourkela.

The team consisting of Dr.K.Satyanarayana, Director, Dr.K.Nagaraj, SRO, Mr.A.Mohapatra, RO and Dr.M.R.Ranjit, RA has taken up a two day programme at the Rourkela Steel Plant on 16th and 17th January 1996. During the visit,the team held consultations with the Heads of Divisions of different disciplines of Ispat General Hospital (IGH), Rourkela. The need for coordinated work was discussed to understand and to prevent recurring epidemics of Japanese encephalitis, dengue fever and *P.falciparum* malaria. The RSP team explained that a substantial portion of fever cases had flavi virus (past) infection and dengue virus (current) infection. It was informed that a large number (60-70) of cases *P.falciparum* malaria per month were reported by the OPD of IGH, Rourkela in recent months. The Director, RMRC, Bhubaneswar indicated that entomological angle of these disease outbreaks could be investigated by the RMRC, Bhubaneswar.

The CME programme began with an inaugural address by Dr.Basudeb Dash, Director, Medical and Health Services, IGH, Rourkela. The key note address on "Health and nutrition profile of the country" including the contributions of ICMR institutions was delivered by Dr.K.Satyanarayana, Director, RMRC, Bhubaneswar. Dr.D.N.Mohapatra, President,IAOH proposed the vote of thanks.

The afternoon session of the CME programme began at 2.30 P.M. and lasted up to 4.30 P.M. Dr.S.C.Das and Dr.D.N.Mohapatra of IGH, Rourkela chaired the session. Dr.K.Nagaraj, SRO presented information on diet and diabetes, diet and cardiovascular diseases, and diet and obesity. Mr.A.Mohapatra, RO presented information on the value of breast feeding, infant weaning foods and the nutrient requirements for various physiological groups. Dr.M.R.Ranjit, RA presented information on anaemia, goitre and Vit-A deficiency and outlined the programmes taken up by Government of India on the recommendations of the NIN, Hyderabad.

The audience consisted of 100 members of IAOH and 50 members of Ladies Club, Rourkela (wives of officers). There was lively discussion on the fortification of common salt with iodine and iron. Many clinicians felt that additional iodine in certain geographical areas may become an extra load. The RMRC team explained the fortification programmes that have been carried out in different countries in the world and presented factual information on the safety of iodine added into the common salt. Dr.Basudeb Dash, Director, Medical and Health Services, Rourkela, complimented the RMRC team regarding the content of the programme and the presentation of the material.

The local cable network "Rourkela TV News Service" covered this programme in the evening news edition. The contributions of ICMR towards health development of the country were highlighted.

11.6. HIV/AIDS AWARENESS PROGRAMMES AT K.B.D.A.V. DEGREE COLLEGE, NIRAKARPUR

In the view of 85th anniversary celebrations of ICMR, a health awareness programme on HIV/AIDS was conducted at KBDAV Degree College, Nirakarpur on 30th January 1996. A team of scientists from RMRC, Bhubaneswar including Dr.K.Nagaraj, SRO, Dr.B.V.Babu, SRO, Dr.B.B.Pal, RO and Dr.G.Bulliyya, RO participated in the programme. Mr.Jena NSS Co-ordinator and Mr.Raghavendra Rao, Vice-Principal of the college have inaugurated the programme. The audience were lecturers and graduate students numbering about 250.

In the first part of the programme, lectures were presented by Dr.K.Nagaraj, SRO and Dr.B.B.Pal, RO on etiology, pathogenesis, diagnosis, modes of transmission and clinical aspects and prevention of HIV/AIDS. After the presentation, there were several questions from the students which led to an interesting and lively discussion on topics of modes of transmission, role of condoms and other aspects of prevention of HIV/AIDS which lasted for a period of half an hour. This was followed by screening of video cassette titled "SCOURGE" prepared by AIIMS, New Delhi. The programme was considered to be fruitful by the teaching staff of Nirakarpur college as there was active participation of the students in the discussion. Alongwith this programme a survey has been carried out by Dr.K.Nagaraj, SRO and Dr.B.V.Babu, SRO to evaluate the awareness regarding HIV/AIDS among the students.

11.7. CONTINUING MEDICAL EDUCATION PROGRAMME FOR PARTICIPANTS OF REGIONAL CONFERENCE ON HEALTH SYSTEMS RESEARCH

The State Institute of Health and Family Welfare (SIHFW), Bhubaneswar requested RMRC, Bhubaneswar to conduct a half-day programme for the participants of their course on health systems research on 2nd February 1996. Dr.Dipika Mohanty, Director, IIH, Mumbai was invited to join the RMRC team for conducting this health awareness programme. She delivered a lecture on tuberculosis, emphasizing the contributions of ICMR. The video cassette supplied by the TRC, Madras was screened for the participants. Dr.K.Satyanarayana, Director, outlined the achievements of ICMR institutes in the field of nutrition. The IEC material supplied by various sister institutions was distributed to the participants. Dr.K.Nagaraj, SRO emphasized the preventive aspects of HIV/AIDS to the participants. Dr.B.V.Babu, SRO, Mr.A.Mohapatra, RO and Dr.J.J.B.Geddam, RO also participated in this programme.

11.8. HEALTH AWARENESS PROGRAMME FOR MEDICAL OFFICERS OF LEPROSY ERADICATION UNIT, KHURDA

The RMRC, Bhubaneswar was requested to host a workshop on "Elimination of Leprosy by 2000 AD" organised by Leprosy Eradication Unit, Khurda on 27th March 1996. The Director, RMRC, Bhubaneswar highlighted the contribution of ICMR in finding solutions to various biomedical problems and distributed the IEC material supplied by Central JALMA Institute for Leprosy, Agra. Different functionaries of Department of Health, Govt. of Orissa, including the Joint Director of Health Services attended this workshop. Five senior staff members of RMRC namely, Dr.S.S.S.Mohapatra, SRO, Dr.B.V.Babu, SRO, Mr.A.Mohapatra, RO, Dr.J.J.B.Geddam, RO and Dr.G.Bulliyya, RO participated in this workshop.

11.9. HEALTH AWARENESS PROGRAMME AT NIMAPARA COLLEGE, NIMAPARA

A health awareness programme was arranged at Nimapara College, Nimapara on 22nd March 1996 in connection with 85th year celebrations of ICMR. Mr.R.K.Hazra, TO, Dr.M.R.Ranjit, RA and Ms.R.Mohapatra, SRF arranged an audio-visual and interaction programme on HIV/AIDS, anaemia and tuberculosis.

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12. GENERAL INFORMATION

12.1. SUMMARY OF JOINT RMRCs MEETING PERTAINING TO RMRC, BHUBANESWAR

The Joint RMRCs Meeting was organised by Dr.G.V.Satyavati, Director General, Indian Council of Medical Research, New Delhi, at RMRC, Bhubaneswar. The names of invited members are given below.

LIST OF INVITEES FOR THE JOINT MEETING OF RMRCs

Governing Body Members of ICMR

1. Prof.M.G.K.Menon
   77, Lodi Estate
   New Delhi-110003.

2. Dr.M.S.Valiathan
   Vice-Chancellor
   Manipal Academy of Higher Education
   Madhav Nagar, Manipal-576119.

Members of Scientific Advisory Board (SAB) of ICMR

1. Prof.C.S.Bhaskaran
   Vice-Chancellor
   University of Health Sciences
   Vijayawada-520008.

2. Prof.V.I.Mathan
   Director
   Christian Medical College
   Vellore-632004.

3. Dr.S.R.Salunke
Director
Directorate of Health Services
Govt. Dental College Building
4th Floor
St. George's Hospital Compound
P D'Mello Road
Bombay-400 001.

4. Dr.Abhay Bang
Director, SEARCH
Gadchiroli
Maharashtra-442605.

5. Prof.L.M.Nath
Dean
All India Institute of Medical Sciences
New Delhi-110029.

6. Dr.Shanti Ghosh
5, Sri Aurobindo Marg
New Delhi-110016.

Directors of RMRCs

1. Dr.S.C.Sehgal
Director
Regional Medical Research Centre
Aberdeen Bazaar
Port Blair-744104.

2. Dr.R.S.Tiwary
Director
Regional Medical Research Centre for Tribals
RMRC Complex
Nagpur Road
Jabalpur-482003.

3. Dr.K.Satyanarayana
Director
Regional Medical Research Centre
Chandrasekharpur
Bhubaneswar-751016.

4. Dr.V.K.Srivastava
Director
Regional Medical Research Centre
N.E.Region
Dibrugarh-786001.

5. Dr.R.C.Chaudhury
Deputy Director & Officer-in-charge
Desert Medicine Research Centre
DMRC Complex
New Pali Road
Post Box No.122
Jodhpur-342005.

Chairpersons of SACs for respective RMRCs

1. Prof.R.C.Mahajan
Professor
Deptt. of Parasitology
P.G.I., Chandigarh-160012.

2. Prof.R.K.Chandorkar
F-2, MYH Campus
Indore-452001.

3. Prof.L.N.Mohapatra
G.M.-10, VSS Nagar
Bhubaneswar-751004.

4. Dr.Mahendra Bhandari
Dean
Sanjay Gandhi Postgraduate
Institute of Medical Science
Rae-bareily Road
Lucknow-226014.

5. Dr.S.P.Thyagrajan
Director
P.G. Institute of Basic Medical Science
University of Madras
Taramani, Madras-600113.

Directors of ICMR Institutes

1. Dr.S.Radhakrishna
   Director
   Institute of Research in Medical Statistics
   1, Sathyamurthi Road
   Chetput, Madras-600031.

2. Dr.R.Prabhakar
   Director
   Tuberculosis Research Centre
   1, Sathyamurthi Road, Chetput
   Madras-600031.

3. Dr.V.P.Sharma
   Director
   Malaria Research Centre
   22, Sham Nath Marg
   Delhi-110054.

4. Dr.Kalyan Banerjee
   Director
   National Institute of Virology
   20-A, Dr.Ambedkar Road
   Pune-411001.

5. Dr.S.K.Kashyap
   Director
   National Instt. of Occupational Health
   Meghani Nagar, Ahmedabad-380016.

6. Dr.S.K.Bhattacharya
   Director
   National Instt. of Cholera & Enteric Diseases
   P-33, CIT Scheme XM
   Beliaghata, Calcutta-700010.

7. Dr.D.Mohanty
   Director
   Institute of Immunohaematology
   New Multistoreyed Building
   13th Floor, KEM Hospital
   Parel, Bombay-400012.

8. Dr.M.Mohan Ram
Officer-in-Charge
National Institute of Nutrition
Jamai-Osmania
Hyderabad-500007.

9. Dr.Dilip Das
Officer-in-Charge
Instt. of Cytology & Preventive Oncology
Maulana Azad Medical College
New Delhi-110002.

10. Dr.V.Dhanda
Director
Vector Control Research Centre
Medical Complex
Indra Nagar
Pondicherry-605006.

Representative from ICMR Headquarters

1. Dr.C.R.Ramachandran
Sr.D.D.G. (NCD)
ICMR, Ansari Nagar
New Delhi-110029.

2. Dr.Lalit Kant
Deputy Director General (ECD)
ICMR, Ansari Nagar
New Delhi-110 029.

3. Dr.R.Ravi
Deputy Director General (IF Cell)
ICMR, Ansari Nagar
New Delhi-110029.

4. Dr.Rashmi Arora
A.D.G. (ECD)
ICMR, Ansari Nagar
New Delhi-110029.

This Centre was chosen as the venue for hosting the Joint RMRCs Meeting held during 27th-28th June 1995 by the D.G., ICMR. Prof.M.G.K. Menon, Member of Governing Body of ICMR chaired this meeting. Dr.G.V.Satyavati, D.G., ICMR and Prof.L.M. Nath, Member of SAB, ICMR, Division Chiefs of ICMR and about 20 Directors of ICMR institutes/

centres and SAC chairpersons of RMRCs participated in this meeting. The functioning of RMRCs was reviewed and revised thrust areas were identified for the six RMRCs, covering different areas of the country.

BACKGROUND INFORMATION ON RMRC, BHUBANESWAR

The Regional Medical Research Centre, Bhubaneswar was established in 1981, with filariasis as the major thrust area. Study of major health problems in Orissa and in the neighbouring states, viz., Andhra Pradesh, Madhya Pradesh and Bihar was the mandate for the RMRC, Bhubaneswar.

Investigation of epidemiology, therapeutics, immunodiagnosis and immuno-prophylactic aspects of filariasis were taken up from the early stages of this Centre. Various haptens, antigenic materials from cattle parasite were investigated to document immuno-diagnosis and immunoprophylaxis potentials. Fraction III, detergent soluble antigen (Dssd), wheat germ agglutinin precipitating antigen (AgW) are under study. Ivermectin therapeutic trials are under progress. The biocide, *B.sphaericus* to control transmission of filariasis is under study. Projects on filarial immunology, bed-nets for control of filariasis transmission are being prepared for extra-mural support. Studies on haemoglobinopathies and nutritional disorders are being planned at district level with cluster sampling technique. Studies on fluorosis, anaemia and goitre control are being taken up in association (networking) with NIN, Hyderabad.

THRUST AREAS, RESEARCH GUIDELINES AND NETWORKING INSTITUTES FOR RMRC, BHUBANESWAR

This Centre was given two thrust areas, namely, filariasis and micro-nutrient deficiency disorders by the Joint RMRCs Meeting. The VCRC, Pondicherry and the NIN, Hyderabad were identified as networking institutions. There were many developments in the country and in the region after the establishment of this Centre in 1981, for this region. After creation of this Centre, several other centres/ institutes (field units) were established by the Council and its institutes/centres in this region for regional health problems as well as for specific disease like malaria. After the establishment of RMRC, Jabalpur (Madhya Pradesh) in 1982 and taking over of RMRIMS, Patna (Bihar) under the ECD Division of the Council, the operational area of this Centre has undergone a major change. The VCRC, Pondicherry

took over the field unit at Jeypore (Koraput district, Orissa) in 1987 and the Malaria Research Centre (MRC), New Delhi established a field unit at Rourkela, Orissa, for in-depth studies on malaria vectors and prevention and control of the disease malaria. These developments have led the Council's review meeting for Joint RMRCs, which had the D.G., ICMR and the Directors of VCRC, Pondicherry and MRC, New Delhi, in its composition to redefine the priorities of RMRCs including RMRC, Bhubaneswar and Jabalpur. This Centre is now expected to serve the states of Orissa and Andhra Pradesh and its sister institutions, under the same ECD Division are catering to the bio-medical research needs of Madhya Pradesh and Bihar. The thrust areas of this Centre are filariasis and micro-nutrient disorders, with VCRC, Pondicherry and NIN, Hyderabad as the networking national institutes. Similar suggestions were given to RMRC, Jabalpur, located in Madhya Pradesh. The RMRIMS, Patna under ECD Division has leishmaniasis as its main thrust area. These institutions under ECD Division are expected to serve Orissa and its neighbouring states. Diarrhoeal disorders, haemoglobinopathies, Japanese encephalitis, HIV/AIDS, etc. are identified as other priorities of this region. The work on malaria in this region is looked after by the field unit, Rourkela of MRC, New Delhi and field unit, Jeypore (Koraput) of VCRC, Pondicherry. In-depth studies on local vectors of malaria and district level studies on the management of malaria are being taken up by the field unit of VCRC, Pondicherry.

The need for setting up of an animal house and radio-isotope facility at this Centre were highlighted at the Joint RMRCs Meeting. The need for strengthening of ties with medical collages of Orissa and Andhra Pradesh was emphasized for this Centre. In addition to the above general observations on the future course of RMRC, Bhubaneswar, major recommendations of the Joint RMRCs Meeting, setting out thrust areas of all RMRCs and general recommendations are given below.

RECOMMENDATIONS:

1. Each RMRC should identify specific thrust area(s) for focused research, in addition to working on regional health problems. This would also help to solve the problem of 'identity crisis'. Accordingly the RMRCs identified the following specific thrust areas:

RMRCs	Thrust area(s)	Networking with	
		ICMR Instt.	Non-ICMR Instt.
Bhubaneswar	Filariasis, Micro-nutrient deficiency diseases	VCRC, Pondicherry; NIN, Hyderabad	State Health Departments
Jabalpur	Haemoglobinopathies	IIH, Bombay	State Health Departments
Dibrugarh	Naso-pharyngeal carcinoma	ICPO, Delhi NIV, Pune	State Health Departments
Jodhpur	Desert malaria	MRC, Delhi	
Port Blair	Leptospirosis, Antimicrobial potentials of indigenous plants	Nil Nil	RRL, Jammu

2. Short, medium and long term action plans should be formulated by each RMRC on the thrust areas so identified, in consultation with experts (including the SAC members).

3. The area(s) should be defined and projectised before networking could be implemented.

4. Assistance from the two chapters of Institute for Research in Medical Statistics (IRMS) at Madras and Delhi should be sought in various stages of project planning and execution.

5. RMRCs should establish the infrastructure required to demonstrate their ability in specific areas, which would help them to establish credibility.

6. Each RMRC should also develop infrastructure (in collaboration with disease-specific institutes) to investigate outbreaks of diseases prevalent in their regions.

7. Meaningful and effective linkages should be established/strengthened with local medical colleges and state health departments.

8. Strategies for effective networking should be evolved by each RMRC through in-depth discussion with disease-specific institutes as also with experts (SAC Chairman/members), based on the thrust areas identified at the meeting (vide Table).

9. Before initiating studies on medicinal plants in the region, a thorough review of literature must be undertaken by each RMRC.

12.2. LIST OF SAC MEMBERS OF RMRC, BHUBANESWAR (AS CONSTITUTED IN JUNE, 1996)

1. Dr.D.S.Agarwal
Professor and Head
Department of Microbiology
University College of Medical Sciences
and Guru Teg Bahadur Hospital
Shahadara, Delhi 110 095 — Chairman

2. Dr.V.Dhanda
Director
Vector Control Research Centre
Medical Complex, Indira Nagar
Pondicherry 605 006

3. Dr.M.K.K.Pillai
Dept. of Zoology
Delhi University
Delhi 110 006

4. Dr.V.Sitaramam
Dept. of Zoology
University of Poona
Ganeshkhind, Pune 411 007

5. Dr.B.B.Tripathy
Retd. Professor of Medicine
Saradiya Mission Road
Cuttack 753 001

6. Dr.V.P.Sharma
Director
Malaria Research Centre
22, Shamnath Marg, New Delhi 110 054

7. Representative of DGHS
Directorate General of Health Services,
O/o. DGHS, Nirman Bhawan,
New Delhi

8. Dr.Kalyan Banerjee
Director
National Institute of Virology
20-A, Dr.Ambedkar Road
Post Box No.11, Pune 411 001

9. Dr. L.N. Mohapatra
Ex-Director, RMRC
GM-10, V.S.S. Nagar
Vani Vihar, Bhubaneswar-751 004

10. Dr.R.S.Tiwary
Director
Regional Medical Research Centre for Tribals
R.M.R.C. Complex, Nagpur Road
Jabalpur 482 003

11. Dr. Sudha G. Gangal,
Director,
Bai Jerbai Wadia Hospital for
Children and Institute of Child
Health Research Society, Acharya Donde Marg,
Parel, Bombay-400 012.

12. Dr. Manorama Bhargava
Professor and Head
Department of Haematology
A.I.I.M.S., Ansari Nagar
New Delhi-1100 029

13. Dr. Dipika Mohanty
Director
Institute of Immunohaematology
New Multistoreyed Building
13th floor, KEM Hospital Campus,
Parel, Bombay-400 012

14. Dr. R.K. Chatterjee
Scientist 'F'
Division of Parasitology
Central Drug Research Institute
Lucknow

15. The Addl. Secretary, Health Services
Orissa Secretariat
Govt. of Orissa, Bhubaneswar

16. The Director, Health Services
Government of Orissa
Heads of Dept. Building
Bhubaneswar

17. Director
Medical Education & Training
Govt. of Orissa
Heads of Dept. Building
Bhubaneswar

18. The Principal
M.K.C.G. Medical College
Berhampur, Dist. Ganjam

or

The Principal
S.C.B. Medical College
Cuttack, Orissa

or

The Principal
V.S.S. Medical College
Burla, Dist. Sambalpur

or

The Principal
Andhra Medical College
Vishakapatnam, A.P.

19. Dr.M.Mohan Ram
Director
National Institute of Nutrition
Jamai-Osmania, Hyderabad-500 007

20. Dr.K.Satyanarayana
Director
Regional Medical Research Centre
Chandrasekharpur,
Bhubaneswar 751 016 Member-Secretary

12.3. PUBLICATIONS

12.3.1. Papers Published in Journals

1. Beuria, M.K., Bal, M.S. and Das, M.K., Allergic reactivity and IgG subclasses to a proteinase fraction of *Setaria digitata* in filariasis. J.Helminthology, 69: 181-185 (1995).

2. Das, D. and Das, M.K., Isolation of microfilariae and eggs of *Setaria digitata*. J.Helminthology, 69: 89-90 (1995).

3. Beuria, M.K. and Das, M.K., Chemotherapy reduces human antifilarial IgE response. Current Science, 69: 257-258 (1995).

4. Bal, M.S. and Das, M.K., Antibody responses to a potentially protective antigen in human filariasis. Current Science, 69: 338-540 (1995).

5. M.K.Das, Book review on Tropical Diseases: Molecular Biology and Control Strategies (CSIR Publication). Current Science, 69: 946-948 (1995) .

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

7. Pal, B.B. and Bhunya, S.P., Mutagenicity testing of a rodenticide, zinctox (zincphospide) in a mouse *in vivo* system. In vivo, 9:81-84 (1995).

8. Dash, A.P. and Hazra, R.K., A small scale field experiment on comparative efficacy of three mosquito larvicides in filarial endemic locality of Orissa, India. Tropical Biomedicine, 12:69-72 (1995).

9. Mahapatra, N., Dash, A.P. and Hazra, R.K., Host selection pattern of twelve mosquito species in Orissa, India. Trop. Biomedicine, 12:147-152 (1995).

10. Balgir, R.S., Population, Ecology and Epidemiology of Sickle Cell Disease in Orissa. Journal of Human Ecology 6:273-76 (1995).

11. Sharma, R.C., Role of geographers in malaria control in India. The Eastern Geographers. Vol. 3 and 4:53-57 (1995).

12.3.2. Papers Published in Proceedings and Books

1. Mahapatra, N., Dash, A.P. and Hazra, R.K., Sandfly fauna of Khurdha district Orissa, India. In: Proc. Int. Symp. on Vectors and Vector Borne Diseases: A.P.Dash and K.Satyanarayana (Eds) National academy of Vector Borne Diseases, RMRC (ICMR), Bhubaneswar, pp.120-122 (1995).

2. Saxena, Ekta., Garg, H.S., Dash, A.P. and Mohanty, U.L., Larvicidal activity of marine organism (Mangrove) against the mosquito culex and anopheles species. *ibid.*, pp.170-175.

3. Mohapatra, R., Ranjit, M.R. and Dash, A.P., Biochemical characterization of *Cx.quinquefasciatus* say after application of Chitin Synthesis Inhibitor. *ibid.*, pp.228-231.

4. Sharma, R.C., Enigma of operational feasibility of bio-environmental control of malaria under primary health care in India-A solution in sight. *ibid.*, pp.61-66.

5. Kumar, A.,Swain, A.K.P.C. and Dash, A.P., Time related prevalence of microfilaria: some observations. *ibid.*, pp.73-77.

6. Balgir, R.S., Genetic Markers in the Tribal Health, Development and Welfare with special reference to North Eastern India. In: Anthropology, Population and Development. Sharma JC (Ed). Inter-India Publications, New Delhi, pp.151-171 (1995).

12.3.3. Papers Communicated

1. Das, B.K., Sahoo, P.K. and Ravindran, B., A role for tumour necrosis factor-α in acute lymphatic filariasis. Parasite Immunology (in press).

2. Mukhopadhyaya, S., Dash, A.P. and Ravindran, B., *Setaria digitata* microfilaraemia in *Mastomys coucha*: an animal model for chemotherapeutic and immunobiological studies. Parasitology (in press).

3. Satapathy, A.K. and Ravindran, B., A quantitative cell-ELISA for α-galactose specific antibodies in human malaria. J. Immunoassay (in press).

4. Mohapatra, R., Ranjit, M.R. and Dash, A.P., Toxicity effect of the insect growth regulator (OMS 3031) on mosquitoes and swiss mice. Asian J. Zool., 3 (in press).

5. Mohapatra, R., Ranjit, M.R. and Dash, A.P., Chitin synthesis inhibitors interfere with the development of *B.malayi* in *Aedes aegypti* (Liverpool strain). J.Helminthology (accepted).

6. Ranjit, M.R. and Mohapatra, A., Intestinal parasitism amongst school children in Khurdha district, Orissa, Asian J. Zoological Science (in press).

7. Nagaraj, K. and Brahmeswara Rao, B.V.N., Social and environmental correlates of childhood diarrhoea. Journal of Human Ecology (in press).

8. Babu, B.V. et al., Genetic affinities of ABO and Rh blood groups among 21 caste populations of Andhra Pradesh, India. Gene Geography (in press).

12.4. CONFERENCES/SEMINARS/SYMPOSIA/MEETINGS ATTENDED

1. Dr.K.Satyanarayana, Director; Dr.B.Ravindran, Asst. Director and Dr.B.K.Das, Honourary Fellow participated in the International Workshop on Types of Diabetes Peculiar to Tropics-1995 held at Hotel Akbari Continental, Cuttack during 17th-19th October 1995.

2. Dr.K.Satyanarayana, Director attended the 14th State Conference of Indian Association of Pathologists and Microbiologists, A.P. Chapter held during 9th-10th September 1995 at Siddhartha Medical College, Vijayawada. He gave an invited guest lecture on 'Research on filariasis - emphasis on immunological aspects'.

3. Dr.K.Satyanarayana, Director; Dr.A.P.Dash, Asst. Director and Dr.B.K.Das, Honourary Fellow participated in the Symposium on "Malaria" during 71st All India Medical Conference organised by the Indian Medical Association during 27th-30th December 1995 at Ravindra Mandap, Bhubaneswar. Details are given in the Extension and Education section (Item 11.2).

4. Dr.K.Satyanarayana, Director; Dr.K.Nagaraj, SRO; Mr.A.Mohapatra, RO and Dr.M.R.Ranjit, RA have taken up a CME programme on "Health and nutrition" for the members of Indian Association of Occupational Health, Orissa Chapter at Ispat General Hospital, Rourkela during 16th-17th January 1996. Details are given in the Extension and Education section (Item 11.5).

5. Dr.K.Satyanarayana, Director attended an invited meeting at the National Institute of Communicable Diseases, New Delhi to develop a nation-wide disease surveillance programme held during 19th-20th July 1995.

6. Dr.K.Satyanarayana, Director attended the meeting of ICMR Institutes/Centres Directors held at Institute of Pathology, New Delhi in the last week of October 1995.

7. Dr.K.Satyanarayana, Director was invited to present the World Bank project of RMRC, Bhubaneswar along with other ICMR institutes/ centres to the World Bank officials in November 1995 held at the World Bank Office, New Delhi.

8. Dr.K.Satyanarayana, Director attended a meeting on "Multi-centric studies with double fortified salt" held at Krushi Bhawan, New Delhi during March 1996 by the Food and Nutrition Board, New Delhi.

9. Dr.M.K.Das, DD attended XII National Congress of Parasitology during 23rd-25th January 1995 in Panaji, Goa and delivered a lecture on "Modulation of antibody responses to defined antigens in lymphatic filariasis after diethylcarbamazine treatment".

10. Dr.B.Ravindran, AD was invited for participation in the IV Brain Storming Session on Molecular Immunology held at the Institute of Microbial Technology, Chandigarh, February 1996.

11. Dr.B.K.Das, Research Fellow attended the Association of Physicians India, Orissa Chapter and presented a guest lecture on "Cytokines in Health and Disease" at Cuttack, November 1995.

12. Dr.B.K.Das, Research Fellow attended the All India Workshop on Filariasis conducted by the Council for Ayurvedic Research, Bhubaneswar and gave a guest lecture on "Clinical profile and management of lymphatic filariasis", March 1996.

13. Dr.S.S.S. Mohapatra, SRO, Dr.K.Nagaraj, SRO and J.J.B.Geddam, RO attended Annual Conference of Indian Medical Association at Bhubaneswar during 27th-30th December 1995.

14. Dr.S.S.S. Mohapatra, SRO participated in a panel discussion on Doordarshan, Bhubaneswar on the occasion of National Science Day on 27th February 1996.

15. Dr. B.B.Pal, RO attended 19th National Congress of IAMM during 5th-8th Oct,1995 at JIPMER, Pondicherry and presented a paper entitled "Sero-prevalence of HIV infection among the jail inmates in Orissa."

16. Dr. B.B.Pal, RO attended the National Seminar cum Workshop on "Current trends in the etiological diagnosis of diarrhoeal diseases", 14th-15th Feb., 1996 at Dr.A.L.M.P.G. Institute of Basic Medical Sciences, Taramani, Madras.

17. Dr. A.P. Dash AD attended the meeting on Surveillance of emerging and reemerging communicable diseases, held at National Institute of Communicable Diseases, New Delhi, June 1995.

18. Dr. A.P.Dash, AD attended consultation meeting of Entomologists at National Institute of Communicable Diseases, New Delhi, August 1995.

19. Dr. A.P.Dash, AD attended WHO/TDR/ICMR Informal consultative meeting on filariasis at Tuberculosis Research Centre, Madras, November 1995.

20. Dr. A.P.Dash, AD attended WHO/NICD meeting on New strategies of filariasis control at National Institute of communicable Diseases, New Delhi, January 1996.

21. Dr. A.P.Dash, AD and Dr. B.K. Das Hon. Res.Fellow delivered invited lectures on "Epidemiology of filariasis" and "Clinical aspects of filariasis" respectively in the National Seminar on Filariasis, organised by the Department of Indian Systems of medicine at Bhubaneswar, February 1996.

22. Dr. A.P.Dash, AD attended the WHO/Oxford University/ICMR workshop on Cost-effective analysis of research projects on vector born diseases, held at Vector Control Research Centre, Pondicherry, March 1996.

23. Dr.R.K.Hazra, TO, Dr.M.R.Ranjit, RA and Ms.R.Mohapatra, SRF attended and presented papers in the Global meet on parasitic diseases held at Hotel Hyatt Regency, New Delhi during 18th-22nd March 1996.

24. Dr.R.S.Balgir, AD presented a paper entitled "Safe motherhood and maternal health in sickle cell disorders" in the Seminar on Women and Development held on 11th July 1995, Bhubaneswar.

25. Dr.R.S.Balgir, AD attended and presented a paper entitled "Preventive Genetic Approaches in Haemoglobinopathy and Thalassaemia in India" in the 3rd International Symposium on Genetics, Health and Disease held during 1st-4th December 1995, Amritsar.

26. Dr.B.P.Dash, RA attended the National Network Meeting on haemoglobinopathy and presented the data of the Human Genetics Division during 26th-27th February 1996 held at Kotagiri, Tamil Nadu.

27. Dr.R.C.Sharma, AD participated in malaria week celebrated in the 1st week of May 1995 and delivered a lecture on "Available tools for malaria control" organized by the Regional Office of Health and Family Welfare, Government of India, Bhubaneswar

28. Dr.R.C.Sharma, AD presented a paper on "Medical Geography-A neglected field in malaria epidemiology" in the session on Medical Geography on 23rd September 1995 and he chaired the session on Medical Geography.

29. Dr.R.C.Sharma, AD participated in the XI Annual Conference of Indian Public Health Association, held at New Delhi and presented a paper on "The key to successful control of malaria in India in 21st Century".

30. Mr.R.K.Das, RA participated as a delegate in the 3rd International Congress, Convocation and Award Presentation Ceremony of Indian Board of Alternative Medicines held on the occasion of World AIDS Day, 1st-3rd December 1995, Calcutta. He was also awarded "Gold Medal" in recognition of dedicated services in alternative medicines.

31. Mr.R.K.Das, RA participated as a delegate in the 3rd International Congress of Alternative Medicines and 8th All India Congress of Alternative Medical Science and Convocation, (organised by Council of Alternative Systems of Medicines, Calcutta) held during 13th-14th January 1996, Rabindra Sarobar Stadium, Calcutta.

32. Mr.Anil Kumar, AD attended the Annual meeting of Indian Society for Medical Statistics held at IRMS, Madras during 22nd-24th November, 1995 and presented a paper entitled "Epidemiology of filariasis transmission: estimation of infectivity index in vector population from Mf data".

33. Mr.Anil Kumar, AD attended the Global meet on parasitic diseases held at Hotel Hyatt Regency, New Delhi during 18th-22nd March, 1996 and presented a paper entitled "Endemicity and force of filarial infection".

34. Mr.Anil Kumar, AD submitted a paper entitled "A study of risk factors of filariasis transmission in Orissa", which was accepted for presentation in XIV International Scientific Meeting of the International Epidemiological Association to be held during 27th-30th August 1996 in Japan.

35. Dr.K.Nagaraj, SRO participated in National Seminar on "Epidemiology of Rabies in animals and man" held in Bhubaneswar on 9th December 1995.

36. Dr.B.V.Babu, SRO attended XXI Annual Conference of Indian Society of Human Genetics held at Vivekananda Institute of Medical Sciences, Calcutta during 15th-17th January 1996. He presented a paper entitled "G6PD deficiency and haemoglobin variants among Rajaka caste of Andhra Pradesh".

12.5. TRAINING OBTAINED BY THE STAFF MEMBERS

1. Mr.P.K.Sahoo, RA visited Vector Control Research Centre, Pondicherry in connection with filariasis networking on studies on microfilarial antigen. November 1995.

2. Mr.P.K.Sahoo, RA attended a workshop on "Advanced techniques in flow cytometry" conducted by the Department of Experimental Medicine and Biotechnology, PGI, Chandigarh during February 9th-11th, 1996.

3. Ms.S.Mukhopadhyaya, SRF underwent training on production of monoclonal antibodies to filarial antigens at the National Institute of Immunology, New Delhi during October-November 1995.

4. Dr.S.S.S. Mohapatra, SRO and Mr.A.S.Acharya, RA attended ICMR/WHO Workshop on "Advanced data analysis and applied modelling", at Vector Control Research Centre, Pondicherry during 12th-21st November 1995.

5. Dr.S.S.S.Mohapatra, SRO, Dr.J.J.B.Geddam, RO and Dr.G.Bulliyya, RO underwent a short term training on "Estimation of Iodine in urine and estimation of serum T_3, T_4 by radioimmunoassay method" at National Institute of Nutrition, Hyderabad during 5th-19th December 1995.

6. Dr.S.S.S. Mohapatra, SRO and Mr.B.Sahoo, Asst. Librarian underwent a short training on "Online searching of bibliographic databases" at National Informatics Centre, Delhi, during 12th-16th February 1996.

7. Dr.S.S.S.Mohapatra, SRO, Dr.B.V.Babu, SRO, Dr.J.J.B. Geddam, RO and Dr.G.Bulliyya, RO participated in the Workshop on Elimination of leprosy by 2000 AD, organised by Leprosy Eradication Unit, Khurda held at RMRC, Bhubaneswar on 27th March 1996. Details are given in Extension and Education section (Item 11.8).

8. Dr.G.Bulliyya, RO participated in Iodization training programme organised by Government of India and Orissa Salt Department at Regional Science Centre, Bhubaneswar on 26th March 1996.

9. Dr.B.B.Pal, RO and Dr.J.J.B.Geddam, RO attended AIDS surveillance camp at Paradeep on 27th Sept. 1995; organised by WHO and OXFAM.

10. Dr.J.J.B.Geddam, RO attended a workshop on diarrhoeal disorders at NICED, Calcutta during 23rd Oct.-5th Nov., 1995.

11. Mr.A.Mohapatra, RO attended a training programme on "Man power planning for Implementation of Development programme for ST population at Institute of Applied Manpower Research (IAMR), New Delhi during 29th Jan.-2nd February 1996.

12. Mr.A.Mohapatra, RO attended a Workshop on "Rethinking Development: We share a common cause" organized by National Commission of Women at Bigyan Bhaban, New Delhi on 8th February 1996.

13. Dr.K.Nagaraj, SRO attended a course on "Biostatistical techniques in controlled clinical trials" at Institute for Research in Medical Statistics (IRMS), Madras during 4th-15th March 1996.

14. Dr.K.Nagaraj, SRO, Dr.B.V.Babu, SRO, Mr.A.Mohapatra, RO and Mr.N.S Marai, RA participated in the training programme conducted for project investigators on "Food security, health and nutrition" by scientists of National Institute of Nutrition (NIN), Hyderabad in connection with the Orissa Household Food Security Project during 13th-14th December 1995. Mr.N.S.Marai, RA participated in the field survey for data collection for about one month to learn methodologies of such surveys.

15. Mr.A.S.Acharya, RA underwent training on modelling and regression analysis at Department of Statistics, Pune University in April 1995.

16. Mr.A.S.Acharya, RA and Mr.B.Sahoo, Asst. Librarian underwent training on INTERNET at NIC, Delhi during 26th-30th April 1995.

17. Mr.A.S.Acharya, RA participated in the course on FOXBASE/DBASE at NIC, Bhubaneswar during 16th-21st October 1995.

18. Mr.B.Sahoo, Asst. Librarian attended workshop on "Elements of Bibliometrics" at INSDOC, New Delhi organised by P & I Division of ICMR, New Delhi during 19th-24th February 1996.

12.6. TRAINING GIVEN AND SUPERVISION PROVIDED BY THE STAFF MEMBERS

1. Lt.Col.Dr.A.Praharaj, M.D. (from Indian Army) received his Ph.D. degree (in Medicine) of Utkal University, Bhubaneswar under the supervision of Dr.M.K.Das, DD for his thesis entitled "Immune responses in human lymphatic filariasis to purified filarial antigens".

2. Mr.R.K.Hazra, TO has submitted his thesis entitled "Mansonioides of Orissa with reference to filariasis" to the Utkal University for Ph.D. degree in March 1996 under the supervision of Dr.A.P.Dash, AD.

3. Dr.Arun Mohanty, a Post Graduate student in Medicine of V.S.S. Medical College, Burla was trained in laboratory diagnosis of haemoglobinopathy and G6PD deficiency during 5th-7th July, 1995 in the Division of Human Genetics.

12.7. OTHER ASSIGNMENTS AND RECOGNITIONS

1. Dr.K.Satyanarayana, Director was invited to serve as Ph.D. examiner in the Centre for Social Medicine and Community Health, School of Social Sciences, Jawaharlal Nehru University, New Delhi in September 1995.

2. Dr.M.K.Das, DD was appointed as examiner for examining Ph.D. thesis entitled "Identification of circulating antigen of *Wuchereria bancrofti* for its role in the diagnosis and pathogenesis of filariasis" submitted to the Department of Biochemistry, Banaras Hindu University, Varanasi.

3. Dr.M.K.Das, DD was appointed as examiner for M.Sc. (Biotechnology) of Banaras Hindu University, Varanasi.

4. Dr.B.Ravindran, AD was invited by Astra Research Centre, India, Bangalore for providing consultancy services. He has rendered advisory consultancy services for their programme of work on malaria, during February 1996.

5. Dr.B.Ravindran, AD visited National Institute of Immunology in connection with the on-going collaborative work on filariasis. He gave a seminar at NII on "Transmission blocking vaccines for filariasis: a pipe dream no more" during May 1995.

6. Dr.B.Ravindran, AD acted as an examiner and conducted a Ph.D. viva-voce examination of JNU at the National Institute of Immunology, New Delhi during October 1995.

7. Dr.B.Ravindran, AD acted as an examiner for a Ph.D. thesis of Dr.M.G.R.Medical University from Tuberculosis Research Centre, Madras.

8. Dr.B.Ravindran, AD was chosen as an expert/assessor in Biological Testing discipline of the Department of Science and Technology, New Delhi for the "National Accredition Board for testing and calibration laboratories".

9. Dr.S.S.S. Mohapatra, SRO was invited to give a special lecture to the inaugural session of a 5 days training programme on Iodine estimation to the staff of Orissa and West Bengal on 26th, March 1996. Also he gave a talk on "The prevalence of IDD and prospects of its control in Orissa".

10. Dr.B.B.Pal, RO was acted as a resource person in the task force meeting, conducted by OXFAM, Bhubaneswar for the control of HIV/AIDS at Paradeep; organised at Bhubaneswar and Paradeep.

11. Dr.B.B.Pal, RO was invited as Chief Speaker by U.N.College, Soro, Balasore on the occasion of Annual Day function on 17th January 1996. He gave a talk on HIV/AIDS.

12. Dr.A.P.Dash, AD and Dr.K.Satyanarayana, Director edited and published the Proceedings of the International Symposium on Vectors and Vector Borne Diseases, sponsored by Bayer (India) Limited, on behalf of National Academy of Vector Borne Diseases, RMRC (ICMR), Bhubaneswar.

13. Dr.A.P.Dash, AD was invited as Chief Speaker by Science Society, Nimapara College on the occasion of Annual Day on 2nd March, 1996 and delivered a lecture on "Vector Borne diseases in India".

14. Dr.M.R.Ranjit, RA delivered a popular lecture on biotechnology to students and lecturers of Konark College, Konark organised by Department of Biotechnology (Govt. of India) and SOLAR, Konark during February 1996.

15. Dr.R.S.Balgir, AD received Vashishat Chikitsak Award 1996 for contribution towards Medical Profession and Community Welfare from the Federation of Indian Medical Societies Association at the 9th National Medicos Congress held at New Delhi.

16. Dr.R.S.Balgir, AD was selected for publication of his Biography in the directories entitled "Reference Asia: Asia's who's Who", "Indo-European Who's Who" and "Indo-Arab Who's Who", Rifacimento International, New Delhi, 1995-96.

17. Dr.R.S.Balgir, AD was selected for publication of his Biography in the directory entitled "Marguis Who's Who in the World. "14th Edition, Marguis Publications, New Jersey, 1997.

18. Mr.A.Mohapatra, RO attended a Regional Workshop on Flood & Water Logging as a resource person held at Gope, conducted by NGOs, VIKAS and Action AID during 18th-20th January 1996.

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12.8. INFORMATION FACILITIES AND OTHER LIBRARY SERVICES

A heavy duty xerox machine was installed in the library for providing photocopy services to the scientists. Arrangements were also made to provide photocopy services for readers from other institutions on payment basis.

This Centre has installed the modem supplied by the ICMR headquarters, for providing on line literature search services to the scientists. One IBM PC-AT/386 computer along with a dedicated telephone line were placed in the library for providing search facilities. This Centre utilised NICNET services to access RENNIC services (Research and Education Networking of National Informatics Centre) of NIC for electronic mail services. On line literature search from MEDLARS data base were carried out for scientists of this Centre on 20 topics during the period under report.

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