

ANNUAL REPORT 2003–04



MALARIA RESEARCH CENTRE
(Indian Council of Medical Research)
22 Sham Nath Marg
Delhi-110 054

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CONTENTS

| | |
|--|----|
| 1. AN OVERVIEW OF THE ACTIVITIES OF THE CENTRE | v |
| 2. ENTOMOLOGY | 1 |
| 3. PARASITE BIOLOGY | 19 |
| 4. EPIDEMIOLOGY | 33 |
| 5. HIGHLIGHTS OF RESEARCH ACTIVITIES UNDER "INTEGRATED DISEASE VECTOR CONTROL" PROJECT | 45 |
| 6. BIOLOGICAL MATERIAL BEING MAINTAINED AT THE CENTRE | 49 |
| 7. INFORMATION, EDUCATION AND COMMUNICATION | 54 |
| 8. COMMITTEES | 74 |
| 9. SCIENTIFIC STAFF OF THE CENTRE | 82 |

AN OVERVIEW OF THE ACTIVITIES OF THE CENTRE

Malaria Research Centre has a network of well-equipped laboratories at Delhi and 12 field units in malarious areas. The Centre is engaged in finding short-term and long-term solutions to the problems of malaria through basic applied and operational field research and also aims at providing useful inputs for strengthening the national antimalaria programme. Research activities carried out during the reporting period have provided useful information in the fields of malaria entomology, parasite biology and epidemiology.

Entomological studies carried out at the Centre were directed towards developing molecular tools for the identification of sibling species of malaria vectors, studies on the bionomics of malaria vectors for better understanding of malaria transmission dynamics and to have alternate vector control options. A pictorial key for the identification of all 58 anopheline species of India was prepared for malaria field workers. Mapping the distribution of *An. culicifacies*, *An. fluviatilis* and *An. dirus* sibling species continued in different parts of the country. Population cytogenetic studies revealed the existence of a new species in *An. fluviatilis* complex. Molecular diagnostic assays developed for the differentiation of members of species complexes were validated with field-collected samples. The molecular basis of refractory mechanism in *An. culicifacies* to plasmodial infection is being worked out. Research activities for vector control included evaluation of new insecticides, biolarvicide formulations, IGR compounds, etc. against immature stages of vector mosquitoes. A large number of plant extracts were screened for their adulticidal, larvicidal and repellent properties.

Good knowledge of the biology of human malaria parasites is a prerequisite for development of new antimalarials and effective malaria vaccine and for proper understanding of malaria epidemiology. Field isolates of *P. falciparum* and *P. vivax* from different parts of India were analyzed for polymorphism of MSP-1 and MSP-2 microsatellite markers and MSP-3a to study genetic diversity and phylogenetic aspects. Studies were carried out on genetic polymorphism of T-cell epitopic region of circumsporozoite protein (CSP) of *P. falciparum* isolates from different regions which will have an important bearing on malaria vaccine development. Reactivity of monoclonal antibodies with *P. vivax* infected erythrocytes and parasite lysate was checked with an objective to develop *P. vivax* diagnostic kit. Likewise studies are in progress to use glycopospholipid (GPL) as a candidate antigen for diagnosing falciparum infection by laser immunoassay. Biochemical studies on parasite enzyme systems were undertaken. *P. vivax* aspartic protease has been purified and characterized for its use as potential drug target. The malaria parasite bank is supporting a large number of organizations working on various aspects of malaria. Screening of medicinal plant extracts/fractions for their antiplasmodial activity against chloroquine sensitive and resistant *P. falciparum* isolates was routinely carried out at parasite bank.

In view of antimalarial drug resistance problem in malaria control therapeutic efficacy studies with first and second line antimalarials (chloroquine and

sulfadoxine-pyrimethamine) were conducted in uncomplicated *P. falciparum* cases in different parts of the country including international borders, which indicate the need to review the drug policy in certain areas. Decreasing efficacy of existing anti-malarial drugs led to the search of new molecules/herbal products for antiparasmodial activity and some plant products screened at MRC have shown promising results. Rapid diagnostic test kits were evaluated for specificity and sensitivity for their use in national malaria control program. Testing of vaccines requires well-characterized field sites where epidemiology of disease is well understood. In this context Phase II activities were started for the preparation of field site for malaria vaccine trial in Sundargarh district, Orissa and a new site is being developed at Jabalpur, Madhya Pradesh. Remote sensing studies in Karnataka have shown good correlation between certain landscape features and malaria incidence, which can be used for malariogenic stratification in problematic paradigms of malaria.

Field units of the Centre actively participated in clinical drug trials, evaluation of diagnostic kits, new insecticides and insecticides treated nets. Besides some important projects have been initiated/completed during the year. A study on the health impact assessment of Sardar Sarovar Narmada water resources development project on mosquito-borne diseases was initiated by Nadiad field unit. Project to develop strategy for integrated control of vectors of malaria, JE and dengue in Gujarat, Madhya Pradesh and Karnataka states has been completed by Nadiad, Jabalpur and Bangalore field units. Evaluation of botanical pesticides was carried out at Hardwar field unit and use of larvivorous fish was scaled up in five talukas and four districts and Mangalore city, Karnataka under the supervision of Bangalore field unit. In addition technical advise, consultancy services were provided to local/state health authorities and other governmental/non-governmental organizations.

Centre celebrated National Science Day by organizing health camps and exhibitions, participated in "Science EXPO-2003" exhibition at Bangalore. "Hindi Week" was celebrated at MRC, Delhi by organizing workshop, symposium and competitions. The Journal of Vector Borne Diseases superseded Indian Journal of Malariology thus widening the scope for contributors. "Malaria Patrika" the popular Hindi magazine was brought out periodically to create awareness in the community about malaria and its control. Seven training courses for medical officers were organized by MRC in collaboration with NVBDCP. Students/researchers from different universities/institutes were provided training on various aspects of malaria by the scientists of the Centre. Nearly 55 research papers were published in national/international journals and MRC scientists participated and presented their research findings in various conferences/workshops held at national and international level.

DIRECTOR

