

NEWS & VIEWS

Issue 04, Feb. 2021

icmr
INDIAN COUNCIL OF
MEDICAL RESEARCH
Serving the nation since 1911



**Malaria in Bombay,
1928**

**Public Engagement
Activities**

Guest Commentary

**Featured Scientific
Publications in Malaria**

**Malaria Scientists
to watch this month**

MERA-India

Malaria Elimination Research Alliance-India

MERA-India Secretariat,

Room no. 344, ICMR-NIMR,

Sector 8 Dwarka, New Delhi-110077



icmr
INDIAN COUNCIL OF
MEDICAL RESEARCH
Serving the nation since 1911



MERA India
Malaria Elimination Research Alliance India
One Platform, One Goal

MERA-INDIA Newsletter 'News & Views' February 2021

Malaria in Bombay, 1928 by Major G. Covell

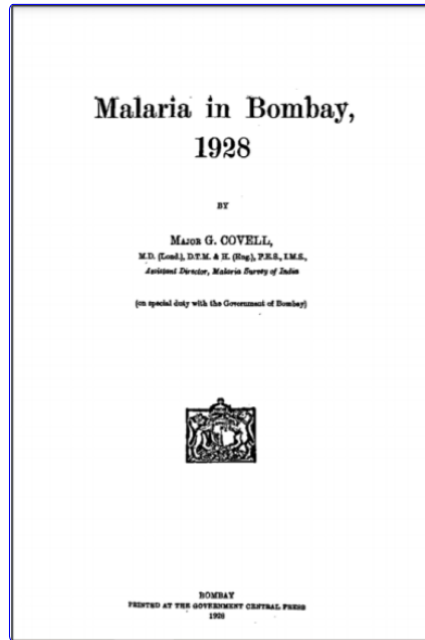


Figure 1: A precious literature gem entitled, 'Malaria in Biology 1928', authored by Major G. Covell, described the critical malarial prevalence in Bombay, India, over a period of six months (March 20th to September 21st) in the year 1928. ICMR-NIMR, Delhi successfully digitized the same for everybody's perusal and made it available in the pdf form on the ICMR-NIMR website (<https://nimr.icmr.org.in/resource-centre/books-guidelines>).

ICMR-NIMR Activities: Public Awareness about Malaria



Figure 2: [Health education and public awareness about malaria \(a-d\)](#). Health literacy is directly proportional to the improved quality of life and is highly critical for malaria prevention, treatment and elimination from India. This figure is a pictorial collage depicting the demonstration of imparting public awareness about the deadly disease malaria among school children (a, b) and adults (c, d) to take necessary precautions to control and prevent malaria in a community.

Understanding Community Behavior for changing the Indian Malaria scenario

Understanding the human response to malaria prevention and control programs is crucial to the success of all malaria control strategies. Human behavior is one of the crucial arms of the host-vector-parasite triangle of malaria and is a vital determinant of the success of control programs. Unfortunately, we do not know enough about how humans respond to malaria and why they respond in the way they do because till date, behavior and applied social science research has had very little role in the design and evaluation of malaria control programs in our country. Is community behavior regarding malaria, only determined by individual knowledge and attitudes?

Community behavior is complex and often people are unaware of the detrimental effects of their behavior on health, or feel unmotivated or unable to change these behaviors. Understanding how people think, feel and learn can help predict how they will act. Hence, understanding community behavior provides insights on how to change behavior. A better realization of health-seeking and treatment behavior will lead to more effective health communication strategies for malaria and promotion of adoption of preventive measures along with early and effective treatment of malaria. For a long while now, attempts to modify community behavior have relied on the simplistic assumption that finding gaps in knowledge and imparting information alone will be sufficient to bring about behavior change. The traditional approach to malaria education has been to stress on biological and medical facts overlooking the fact that the way people perceive malaria and accept or use prevention and control measures are also determined by social and behavioral barriers.

Some of the reasons that only education about the relationship between mosquitoes and malaria is usually not successful for behavior change, have been due to misconceptions arising from the fact that many mosquito bites may not result in malaria, yet one can get malaria after a few bites or even without being bitten recently, depending on the mosquito species that is biting, the percentage of mosquitoes infected, and the possibility of malaria relapse or recrudescence. Furthermore, someone who installs screens on the house, uses mosquito nets, and eliminates larval development sites around the house may get malaria, while someone who takes none of these precautions may not. As a result, the community perceives that malaria control is complex and is unwilling to participate in time-consuming malaria control activities.

So, before we can change people's decisions about any behavior, we need to know how judgments and decisions are made on these issues. This poses a formidable challenge because behavior is very complex. Yet, there are behavioral Change Theories and models which help to explain behavior and suggest how to develop more effective ways to influence and change behavior. Different theories and models can be applied towards understanding and changing Behavior in individuals and communities. For example, when one is attempting to overcome personal barriers for use of LLINs, the Health Belief Model may be useful, whereas in developing interventions for promoting use of LLINs in the community, the Trans Theoretical Model may be useful and when trying to change community practices for vector breeding, community organization theories are more suitable.

The strongest behavior change interventions are built from multiple theories. When combining theories, it is important to clearly outline the unique contribution of each theory to the combined model. In population-focused programs, it is of limited value to adopt a program oriented solely toward modifying individual's behaviors. A more productive strategy would also include environmental change, for example expanding the availability of LLINs. When this step is done along with individual skill training, longer-lasting and meaningful changes can be achieved.

However, it is also important to accept the fact that people do not change behaviors quickly and decisively - change in behavior, especially habitual behavior, occurs continuously through a cyclical process which must be understood and applied while attempting to change individual behavior related to malaria prevention and control. Long-term changes in health behavior involve multiple actions and adaptations over time.

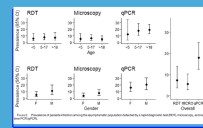
India's National Malaria Program has undergone a paradigm shift from health facility to community-based approaches. However, changing behavior of communities requires an understanding of how social systems operate, how change occurs within and among systems, and how community changes influence their behavior and health. Consultations with the community can reveal whether a certain intervention will be accepted and, if so, to what extent. There may be no point in implementing interventions aimed at decreasing malaria transmission unless a high level of acceptance is expected. Unfortunately, little is known about methods of involving communities in decision making and program evaluation as these activities relate to malaria control.

Active community participation in the design and implementation of malaria control programs can greatly increase the chances of success. Communities are rarely involved in real decision making and therefore feel that they have little stake in program outcome. Assumptions regarding what a community wants, need, or will support are usually made by program planners rather than the community. Many times, such plans are forced upon the villagers and the latter acquiesce passively to their implementation, without participating in them. Their reluctant acceptance without protest is often mistaken for cooperation/participation.

A malaria control project in which community participation was encouraged in the planning and implementation phases was carried out by the Vector Control Research Centre (VCRC) of Pondicherry, India. One of the project's initial findings was that the community's objectives did not coincide with those of disease control. To pursue both sets of objectives, a flexible integrated approach needs to be taken. Community-level behavioral models can provide frameworks for understanding how communities function and change, and how they can be activated towards behavior change.

Finally, it is necessary that we realize that an 'Enabling Environment' characterized by policies promoting healthy malaria-related behaviors, the availability of and access to commodities, and a strong infrastructure for health service delivery is necessary to support SBCC activities. Programs should assess whether low uptake of a behavior is due to attitudinal factors, limited access to commodities, service delivery issues, or policy barriers. (*Dr. Madhumita Dobe, Director-Professor (Public Health), Department of Health Promotion & Education, AIIPH, Kolkata*)

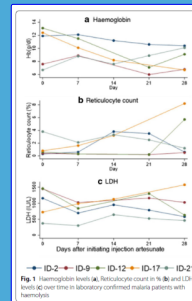
Scientific Contributions by dedicated Scientists/ Researchers in the field of Malaria Research



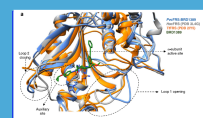
Prevalence of Asymptomatic Malaria Parasitemia in Odisha, India: A Challenge to Malaria Elimination

[Kumari et al., 2020](#), described that Indian population in state of Odisha has prevalence of asymptomatic and sub-microscopic malaria. The authors conducted a cross-sectional survey Kandhamal district of Odisha. Blood samples collected from this area were screened using various diagnostic methods such as RDTs, qPCR, microscopy, which revealed 18% asymptomatic cases of *Plasmodium*, with much higher prevalence for *P. falciparum* than *P. vivax* or mixed infections. An accurate identification of malaria carriers would help in developing potent strategies to facilitate malaria elimination completely.

Delayed haemolysis after treatment with intravenous artesunate in patients with severe malaria in India



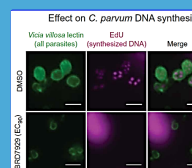
[Savargaonkar et al., 2020](#), showed that delayed hemolysis as assessed by various markers like haemoglobin, LDH, reticulocyte percent, haptoglobin, occurred in severe malaria patients after treatment with Artesunate and should be taken into consideration while providing treatment against severe malaria and thus, requires further exploration of the underlying epidemiological studies.



Structural basis of malaria parasite phenylalanine tRNA-synthetase inhibition by bicyclic azetidines

[Sharma et al., 2020](#) worked on underlying mechanism by which potential anti-malarial drugs such as bicyclic azetidines specifically inhibit *Plasmodium* cytosolic phenylalanine tRNA-synthetase (cFRS), offering a single dose cure in mice models. Structural and biochemical studies revealed that bicyclic azetidines act as potent competitive inhibitors of L-Phenylalanine one of three substrates required for the cFRS-catalyzed aminoacylation mechanism that adversely affects the translation process in the parasite. The co-crystal structure of a PvcFRS-BRD1389 complex reported by authors shows that the bicyclic azetidine ligand binds to two distinct subsites within the PvcFRS catalytic site. This provides a universal structural framework for development of drugs against *Plasmodium*.

Bicyclic azetidines kill the diarrheal pathogen Cryptosporidium in mice by inhibiting parasite phenylalanine-tRNA synthetase



[Vinayak et al., 2020, reported that bicyclic azetidines have been recognized as potent and novel anticryptosporidial drugs, inhibiting cellular growth of three *Cryptosporidium parvum* species with EC50 values ranging from 0.4 to 96 nM, when assessed in three out of four immunocompromised mice models.](#) Further analyses revealed the mode of action of these drugs, viz., *C. parvum* phenylalanyl-tRNA synthetase (CpPheRS), specifically inhibiting the aminoacylation activity of recombinant ChPheRS and mutations in the same imparts resistance to anticryptosporidial drugs.

Malaria Scientists to watch: 1. An interview with Professor Dhanpat Kochar



Professor Dhanpat Kochar, **Chairman, Research Advisory Committee, Multidisciplinary Research Unit, Former Professor and Head, In-charge: Cerebral Malaria Research Centre S.P. Medical College, Bikaner – 334 003, Rajasthan, India.**

1. Your origin story: please describe your research background and what has been the biggest motivation in your life that helped you to become a malaria scientist?

I am working in a peripheral medical college with minimal resources of manpower, money and machines for doing research but rich in clinical material (including malaria). There is either no funding or very little funding available for clinical research. But, I believe that if you have a vision for going ahead with aim (as malaria in my case), nobody can stop you and you may achieve higher goals as reflected my present google scholar indices – citations 6030; H indices 41; and i10 indices 96. I got my first funding after 15 years of active research on malaria. I am sure that in spite of working in a completely unknown research institute, I was able to do quality research. The main motivation was the availability of clinical material (malaria) in spite of paucity of manpower, money and machines. Finally, I reckon that any young researcher can also achieve great heights if he/she works with sincerity in a specific field.

2. Throw some light on your line of research and what has been the importance/impact of your research so far that is inspiring for young researchers?

My major area of research is studying clinical aspects of both *P. falciparum* and *P. vivax* induced malaria. I have around 180 publications and about 14 chapters in different books. I have delivered many lectures several International conferences on malaria such as at Barcelona, Rio-de-Generio, Manaus, Guatemala, Gamboa, Goa, Manaus, London, Limoges (France), WHO MALVAC Meeting 2007 as Advisor in Global Coordination of the Development of vaccines against Malaria in Pregnancy (MiP). I delivered around 5 orations at the National and State Levels. I earned the second best prize twice for best paper presentation on malaria and the best referee award for JAPI (2008). The outcome of my 30 years of research includes the publication of largest series on adult cerebral malaria, hepatocyte dysfunction including hepatic encephalopathy, hypoglycemia and effect of malaria on pregnancy (both *vivax* and *falciparum*). However, the main thrust of my research is focused on severe *vivax* malaria. Importantly, the first description in world literature in 2005 and the largest series in world (PCR diagnosed) on severe *vivax* malaria goes to my credit. A nonexistent term – Severe *Vivax* malaria is now well accepted at all levels. The original research paper on severe *vivax* malaria by Kochar et al (2005, 2009 & 2010) have around 475 citations, 451 citations and 169 citations respectively. The outcome of whole research which was conducted at Bikaner, India confirms that benign tertian malaria (*vivax* malaria) is certainly not always benign. My publications have definitely enriched the knowledge on *P. vivax* and offered something which can be used for bedside to bench (Bassat Q, Alonso PL. Nature Medicine 2011 Jan;17(1):48-9). After my publications, more than 100 publications on this subject has been published from different parts of India, Indonesia, Papua New Guinea, Brazil, Pakistan, Sudan and Peru.

3. What are the research gaps that you think require urgent attention in eliminating malaria from India?

. In my opinion we should start working on *P. vivax* from the beginning rather than taking it lightly because this is going to cause maximum trouble in the elimination program in the near future.

. My invited review on research gaps in *vivax* malaria in lancet infectious disease has more than 626 citations (Mueller I, Galinski MR, Baird JK, Carlton JM, Kochar DK, Alonso PL, del Portillo HA. *Key gaps in the knowledge of Plasmodium vivax, a neglected human malaria parasite*. Lancet Infect Dis. 2009 Sep;9(9):555-66).

4. Finally, other than malaria research, did/do you have any other research interests?

. Another intriguing research field according to me is studying the effect of camel milk on blood glucose levels and its importance in management of diabetes mellitus.

. The rediscovery of a specific snake (*Echis sochureki*) in Thar Desert region also goes to my credit (Kochar et al. Rediscovery of severe saw-scaled viper (*Echis sochureki*) envenoming in the Thar Desert region of Rajasthan, India. Wilderness Environ Med. 2007; 18(2):75-85). Presently, we are working on separating the venom and preparation of

monovalent anti snake venom against this viper. Interestingly we are raising antibodies in camels.

2. An interview with Dr. Raju Ranjha



Dr. R. Ranjha, Scientist B and Officer-in-Charge ICMR-National Institute of Malaria Research, Field Unit, RLTRI Campus, Lalpur, Raipur – 492 015, Chhattisgarh, India.

1. Please describe your research background and what has been the biggest motivation in your life that helped you to become a malaria scientist?

Since the beginning of my research career, I had been working on human diseases. I did my PhD on "Exploring the role of microRNA in Inflammatory Bowel Disease" from School of Life sciences (SLS), Jawaharlal Nehru University (JNU). My research work was done both at SLS, JNU and at Gastroenterology Department All India Institute of Medical Sciences (AIIMS), Delhi. During my PhD, I worked with patients' intestinal mucosal biopsy samples collected at Gastroenterology Department AIIMS during Colonoscopy. I have seen human suffering very closely during my PhD that immensely motivated me to join ICMR. As a malaria scientist, I can do work for the betterment of society by contributing through my research on human diseases.

2. Enlighten us about your line of research and what has been the importance/impact of your research so far that is inspiring for young researchers?

From the beginning of my research career at ICMR-NIMR, I had been working in Chhattisgarh. I think, in order to carry out a good scientific research, curiosity is the key. I was always curious about understanding different cultures in India. By working at Chhattisgarh, I got a chance to do my research studies in the tribal areas of Chhattisgarh. Tribal communities are affected the most by vector-borne diseases like malaria. Through my research studies, we reported the hidden reservoir of asymptomatic malaria in the community. We found that school-age children constitute the major malaria reservoir group that remains undetected and contributes to malaria transmission. We also carried out therapeutic efficacy studies for current malaria treatment drugs in Chhattisgarh. I also carried out two outbreak investigations in Chhattisgarh, one related to malaria and the other for dengue.

3. What got you interested in starting a career at ICMR-NIMR and how has been your journey till date?

My past research on human diseases and ultimate goal to contribute towards building a healthy society, I joined ICMR-NIMR. My journey till date has been quite good. I had worked in the deep forested regions of the country, inhabited by tribal Indian population. I saw the natural beauty of forests, tribal culture and their innocence, which I think would not have been possible to witness had I not gotten the opportunity to work as a ICMR-NIMR Scientist. Going to the field and looking at malaria control's ground situation motivates me to do hard work with more dedication in the future.

4. What are research gaps that you think require urgent attention in eliminating malaria from India?

Malaria elimination from the country requires increased community participation in the control of the disease. Interventions should be focused on engaging the community in the control activities. One area where research is needed to be strengthened is Malaria Vector Biology and Control. As malaria vectors are developing resistance to the insecticides being used, research must delay the resistance development and bring new tools for vector control. As there is also a threat of drug resistance development by the parasite, focused research is required on parasite biology to find out new molecules used in malaria treatment.

5. Finally, on a lighter note, do you have any hobbies other than science that keeps you going on even during challenging times during your research career?

Listening to music, gardening and maintaining a healthy lifestyle are my interests that keep me motivated. Trying exotic tribal fruits and knowing their culture/traditions have also become my hobbies while working on malaria.



Copyright © 2020 MERA-INDIA, All rights reserved.

Our mailing address is:

meraindiaicmr@gmail.com

Address: MERA India Secretariat, Room No. 344,
ICMR-National institute of Malaria Research,
Sector 8, Dwarka, New Delhi- 110 077

Telephone: 011-25307344

Website: <http://meraindia.org.in/>