Vol 1 No 2 Jan 2021

वेक्टर VECTOR पत्रिका

E-Newsletter of ICMR-Vector Control Research Centre, Puducherry

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JOIN HANDS TO SPREAD AWARENESS AGAINST VECTOR BORNE DISEASES!

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Volume 1 Issue 2 January 2021

Response:
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From the Director's Desk

My warm greetings to all!

COVID 19 Pandemic continued its sway across the globe with surge in the reported cases especially in the USA, Europe and Latin America with high morbidity and mortality. In India too, since July 2020, there was a spurt in the COVID-19 cases amidst several advisories from the Govt. of India and extension of lockdown. The reported infections of SARS Cov-2 peaked at 97894 on16th Sept. in India. Overall, India performed far better in containing the virus by ramping up of diagnosis and effective quarantine of infected persons by establishing 3000+ laboratories and creating supportive services and treatment facilities. ICMR was at the center of India's fight against SARS-CoV-2, by creating countrywide diagnostic facilities and conducting several landmark studies in a short time. On 31st Dec., 21822 COVID-19 cases were reported showing more than 4-fold decrease compared to the peak cases in Sept. 2020. With the persistent declining trends of new infections and rising recoveries coupled with low case fatality rate and hopes of roll out of the two made-in-India vaccines, Covishield and Covaxin, the national mood seemed upbeat by the end of 2020. For the ICMR, the development of Covaxin by the ICMR-NIV in collaboration with Bharat Biotech company was yet another shot in the arm. What a proud moment for the ICMR as it proved its dependability as a premium medical research council set up 110+ years ago! These contributions by ICMR are by far no means small as they had direct and indirect implications on saving human life and the economy of the country. This contribution will make every Indian proud of ICMR which has become a household name in the country ably led by Director General Prof. Balram Bhargava.

ICMR-VCRC also rendered its share of little contributions by establishing a state of the art COVID-19 testing facility which was inaugurated by Dr. Rakesh Aggarwal, Director JIPMER. About 30000 samples received from Puducherry Govt. were tested in this laboratory and over 3200 cases were detected positive.

I thank Dr. R. L. J. De Britto for his commendable services, by providing timely safety instructions and advises to the staff during the pandemic. I also thank the Scientists and Technical staff for their co-operation in establishing and functioning of the COVID -19 diagnostic facility and for rendering their valuable services. VCRC bows its head to all the frontline workers in the country, several of whom got infected and lost their lives while serving the nation. Salutations! Salutations! Salutations!

VCRC's 45th Foundation Day was celebrated on 6th of August 2020 virtually. The Director General ICMR, Prof. Balram Bhargava complimented the VCRC for its all-round achievements under challenging circumstances and released four documents. Dr. G. S. Toteja, Addl. DG ICMR, Dr. G. S. G. Ayyangar IAS, Sr. DDG (Admn), Shri Rajeev Roy, Sr. Financial Advisor, Directors of the ICMR Institutes, past Directors of the VCRC and several guests from the country and the overseas graced the function. On this occasion, a new website of the institute vcrc.icmr.org.in was also inaugurated. As on 31st of Dec. the website has received 91034 visitors.

The institute celebrated the Independence Day in full strength and gusto with salutation to the national flag. All the Corona warriors of the VCRC were felicitated and their services were recalled and recognized. On this day, *inter-alia* a new canteen was inaugurated at the hands of Senior Scientist of the institute, Dr. S. Poopathi. The Hon'ble Chief Minister of Puducherry, Shri V. Narayanasamy along with Hon'ble Health Minister Shri Malladi Krishna Rao visited VCRC on the 8th of September 2020 and familiarized themselves with the step-by-step diagnosis of COVID-19 infection.

On the 2nd of October 2020, a new painting of Mahatma Gandhi was unveiled at the institute and the staff offered rich floral tributes to the father of the nation on his 'Jayanti'.

Under the prevailing pandemic, VCRC had to resort to virtual mode to conduct its 42nd Scientific Advisory Committee (SAC) meeting in two stints, a pre-SAC review of the ongoing, completed and new proposed projects on 19th and 20th Nov. and the main SAC meeting on the 27th of Nov. 2020. The Hon'ble Chairman and the SAC members extended full cooperation and mentored Scientists and Technical Officers during the reviews and suggested improvements where ever necessary. Thanks to the SAC experts for their sincere and enabling advice and to the staff for their enthusiastic support for the conduct of the meeting.

A team of VCRC Scientists visited Bharathiar University, Coimbatore between 9-11th of Dec. 2020 for establishing collaborations in research and technological developments. A Memorandum of Understanding was signed between the Hon'ble Vice Chancellor of Bharathiar University, Prof. P. Kaliraj and Director VCRC to that effect.

I am thankful to the Director General ICMR for reposing faith in my abilities by entrusting with an opportunity to serve the Council by holding Additional Charge of the National Animal Resource Facility for Biomedical Research (ICMR-NARFBR) at Genome Valley, Hyderabad.

Finally, I am very much thankful to all the Senior Consultants, Scientists, Technical Officers and Administrative staff for their excellent performance. VCRC has been enriched with the joining of Dr. S. L. Hoti as ICMR-Emeritus Scientist. I am very hopeful that we will continue to strive to maintain highest standards of research in providing practical solutions and by formulating effective strategies for managing the vector borne diseases in the country. I am also hopeful that the VCRC Scientists and Technical staff will continue to innovate new vector surveillance and control tools. I am happy to release the 2nd Volume (January 2021 issue) of the 'Vector' and thank all the contributors, the editorial and publishing staff for their sincere and hard work in bringing out this issue.

Jai Hind!

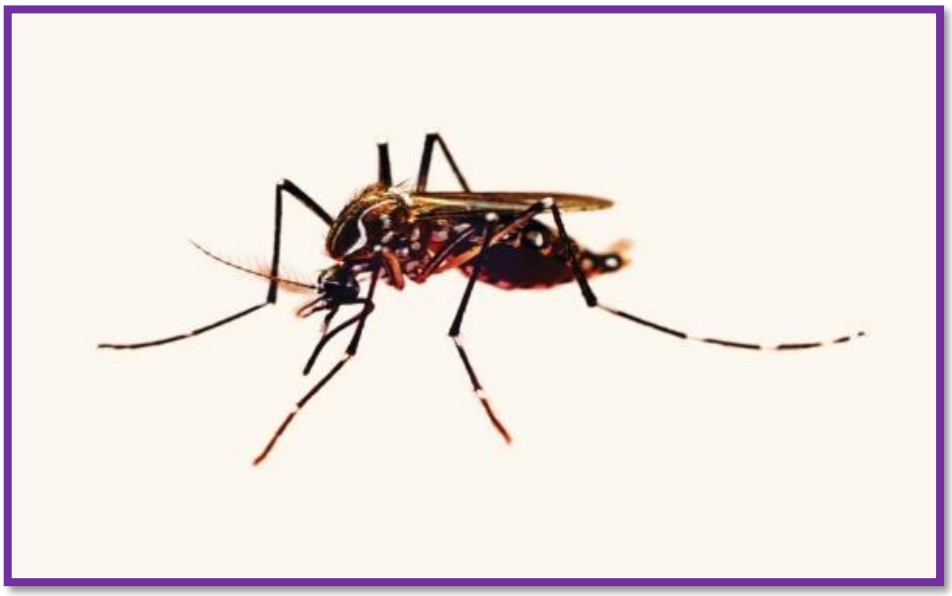
BEWARE OF DENGUE AND CHKUNGUNYA.

Aedes aegypti and *Aedes albopictus* mosquitoes transmit these diseases

Padmashri Dr. P. K. Rajagopalan, Former Director, ICMR-VCRC, Puducherry

*Aedes aegypt*i, the principal mosquito vector of dengue and chikungunya viruses is an insect closely associated with humans and their dwellings (Picture, right); see the sickle shaped white marking on its back. *Aedes aegypti* is an aggressive daytime biting mosquito. Only the females bite. Biting is most intense in the hours around dawn and dusk. Indoors, the mosquitoes can bite at night in well-lit homes. They are adept at hiding in closets and under beds. Adult mosquitoes of both sexes feed on sweet things, like nectar and fruit, but females need the protein in blood to develop their eggs. *Aedes aegypti* females are so-called **"sip feeders**". Instead of drawing sufficient blood for a meal in a single bite, they take multiple little sips during multiple bites, *thus increasing the number of people a single mosquito carrying the virus can infect*. After a blood meal, females produce an average batch of 100 to 200 eggs, depending on the size of the blood meal. Unlike most other mosquito species, a female *Aedes aegypti* can produce up to 5 batches of eggs during her lifetime. As yet another survival tactic, a single female lays her batches of eggs at several different sites. All of these features make *Aedes aegypti* populations extremely difficult to control. They also make the diseases they spread a much larger menace.

It is a well-known vector of Yellow Fever, which fortunately does not occur in India; but also transmits Zika virus in Brazil and several other countries. Dengue, Chikungunya and Zika viruses are mainly transmitted by the bite of infected *Aedes aegypti* mosquitoes. People not only provide the mosquitoes with blood meals but also water-holding containers in and around the home needed to complete their development, since artificial containers of various types are recognized breeding places. Their aquatic habitats are tree cavities to toilets, cups, window air conditioners, discarded tyres, coconut shells, etc. People also furnish shelter as *Aedes aegypti* preferentially rests in



darker cool areas, such as closets leading to their ability to bite indoors. The mosquito lays her eggs on the sides of containers with water which can withstand desiccation and eggs hatch into larvae after a rain or flooding. A larva changes into a pupa in about a week and into a mosquito in two days. It is very difficult to control or eliminate *Aedes aegypti* mosquitoes because they have adaptations to the environment that make them highly resilient, or with the ability to rapidly bounce back to initial numbers after disturbances resulting from natural phenomena (e.g., droughts) or human interventions (e.g., control measures). One such adaptation is the ability of the eggs to withstand desiccation (drying) and to survive without water for several months on the inner walls of containers. For example, if we were to eliminate all larvae, pupae, and adult *Aedes aegypti* at once from a site, its population

could recover two weeks later as a result of egg hatching following rainfall or the addition of water to containers harboring eggs.

It is likely that *Aedes aegypti* is continually responding or adapting to environmental change. For example, it was recently found that *Aedes aegypti* is able to undergo immature development in many environmental conditions resulting in the production of hundreds or thousands of *Aedes aegypti* adults per day. In general, it is expected that control interventions will change the spatial and temporal dispersal of *Aedes aegypti* and perhaps the pattern of habitat utilization; it is an invasive, domestic species with tropical and subtropical worldwide distribution that originated in Africa.

Another important mosquito vector of dengue and chikunguniya is *Aedes albopictus*, (picture below) which is also an invasive species originally from Asia. You can easily recognize this voracious man biter during the day. Since they are black in colour, with white marking on its legs, and a prominent white streak on its back and therefore commonly called the Tiger Mosquito. The arrival of *Aedes albopictus* has been correlated with the decline in the abundance and distribution of the yellow fever mosquito, *Aedes aegypti*. Compared to *Aedes aegypti*, *Aedes albopictus* currently is widespread throughout South East Asia. *Aedes albopictus* is a very competent vector of many viruses including Dengue and Chikungunya in India. Its life cycle is also closely associated with human habitat, and it breeds in containers with standing water, often tyres or other containers. Tree holes in wooded areas are its favourite breeding ground. It is a daytime feeder and can be found in shady areas where it rests in shrubs near the ground. *Aedes albopictus* feeding peaks in the early morning and late afternoon; it is an opportunistic and aggressive biter with a wide host range including man, domestic and wild animals. The worldwide distribution includes most of Asia and covers tropical and subtropical regions worldwide with introductions into the Caribbean. Endemic to Asia and the Pacific islands, the range has greatly expanded to include North and South Americas, Africa and Europe.

As it so often happens in public health, when a health threat subsides, the control programme dies. Resources dwindle, control programmes collapses, infrastructures dismantled, and fewer specialists are trained and deployed. (A good example is that of Malaria Control set up in India post eradication era). The mosquitoes – and the diseases they transmit –roared back with a vengeance. They returned to an environment with few defenses left intact. Nearly two decades of diminishing interest and dwindling expertise severely weakened national capacities to implement programmes for mosquito control. Compared with the situation 50 years ago, the incidence of Dengue

and Chikungunya has risen 30-fold. Dengue epidemics have become a recurring annual feature in many places, particularly after the rains. Many countries are now reporting their first outbreaks. This can very well prompt some experts to ask, **what hope is there that a major epidemic of any new disease, like Zika, can be prevented?**

The scientists will tell you that they have invented many new techniques like genetically modified mosquitoes which does not bite; sterile male releases; releasing bacteria infected mosquitoes, etc. All methods have severe draw-backs. Therefore, take personal protection measures against mosquito bites, prevent water stagnation in artificial containers and follow proper domestic waste management methods, to prevent mosquito borne diseases.

In the case of dengue, the existence of a cycle apart from man has yet to be demonstrated, though it was suggested as far back as 1931 that there might be a sylvatic cycle with *Aedes albopictus* as vector and monkeys as sylvatic hosts. Dengue occurs throughout the tropical region and spreads into sub-tropical and warm temperate zones where *Aedes aegypti* is present. It has been suggested that urbanization of new strains of dengue viruses, which has previously existed in some sylvatic reservoir, transmitted by *Aedes aegypti* and with hemorrhagic manifestation (in some countries), had taken place (Hammon). In the presence of *Aedes aegypti*, dengue always occurred in en-demic form. Whether vector density and extrinsic incubation governed the occurrence of the epidemic is not clearly understood. Lots of studies have been done in many countries. In Malaysia, *Aedes aegypti* is a vector in coastal region and *Aedes albopictus* in the interior (can you predict a similar situation with chikungunya in Kerala?). High proportion of monkey sera was found with antibodies ~~with~~ of dengue. There is also strong evidence that dengue is endemic in areas in many countries where monkeys were not present. It is possible that different groups of mammals are important in different parts of the world. Another important disease is Chikungunya, causing severe fever with polyarthritis. This is at present an urban disease in India. Both *Aedes aegypti* and *Aedes albopictus* have been incriminated as vectors. There is only one piece of evidence to suggest a sylvan cycle for this virus. A strain of this virus was isolated from *Aedes africanus* caught in **Zika** forest indicating that there is also a sylvan cycle other than man /*Aedes aegypti* /*Aedes albopictus* cycle. In short, the forms of hemorrhagic dengue and Chikungunya disease are essentially urban diseases with a cycle between man and mosquito. There may be sylvatic cycles of these viruses and in epidemic phase they are not involved. The occurrence of Chikungunya cases in typically rural areas in Tamil Nadu was recently reported but this needs confirmation. It may be possible that there is an *enzootic cycle involving small rodents and shrews*. These mammals have large population turnovers and can be ideal partic-ipants in an enzootic cycle. The possibility of non-mosquito vectors like gamasid and laelaptid mites to maintain a rodent – mite – rodent chain also cannot be ruled out.

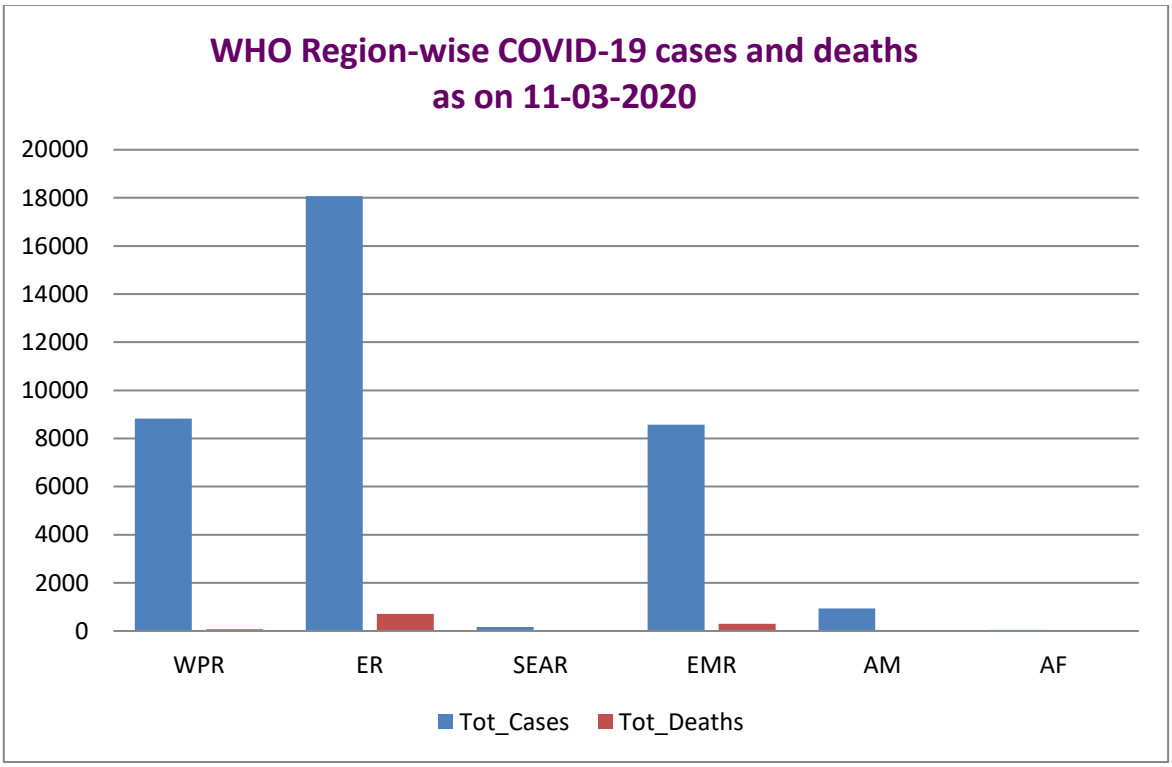
Considerable amount of research work has to be undertaken in all these aspects, as chikungunya can pose serious public health problems in the future.

Awareness, Vigilance and Adherence of Safety Measures Overcome the Challenges of the Institutional COVID-19 Transmission

Dr. R. L. J. De Britto, Dr. Dinesh Raja and Dr. Ashwani Kumar, ICMR-VCRC, Puducherry

1. Preamble

During the last quarter of 2019 an unknown viral pneumonia caused mortality in Wuhan, China that was coined as coronavirus disease 2019 (COVID-19) as this fatal pneumonia was caused by coronavirus 2 (SARS-CoV-2). Initially, this was recognized as an epidemic restricted to China. Few clinical and epidemiological studies from China brought to light, the place of origin of the virus and the predominance of mortality in elderly and the persons with other chronic diseases (1-3). Before the World Health Organization (WHO) notified it as pandemic on March 11, 2020, the virus had spread to several European countries and North America. At this point of time there were more were 118319 confirmed COVID-19 cases, 4292 deaths from 114 countries (4). Figure-1 depicts the WHO region-wise number of confirmed COVID-19 infection and the total number of deaths as on 11 March 2020.



Age and co-morbidities appeared to have significant role in clinical outcome in high income countries and wide-spread disparities in income and barriers to quality health-care are significant factors in middle and low-income countries (5-7). In India, the first confirmed case of COVID-19 was reported from a traveller to Wuhan, China and the transmission and mortality increased significantly from May 2020 (figure 2 and 3). However, in the Union territory of Puducherry the raise in transmission was observed from June 2020 (figure-4).

Fig-2 Month-wise COVID-19 cases in India

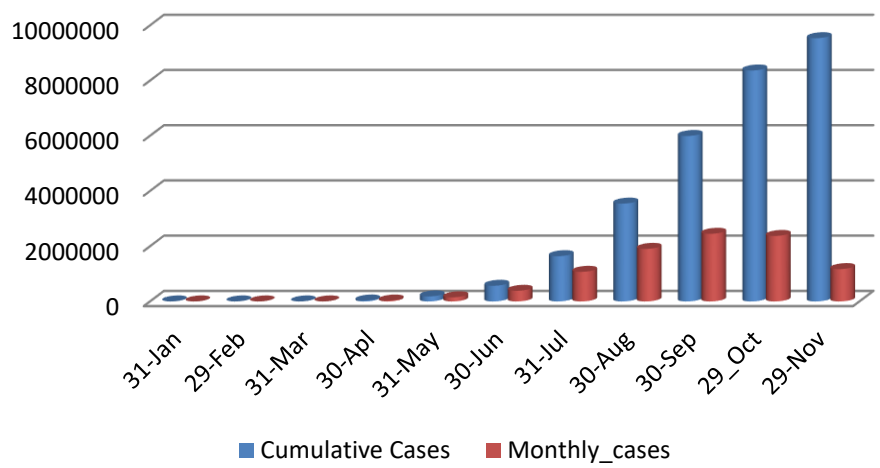


Fig-3 Month-wise COVID-19 deaths in India

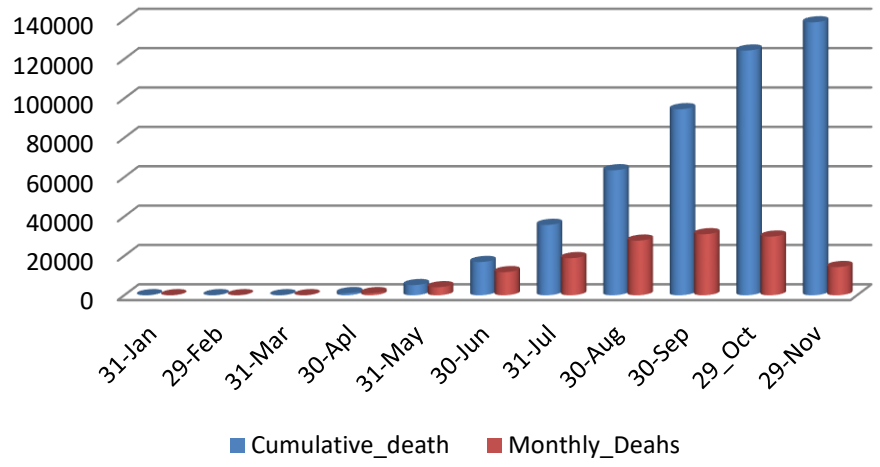
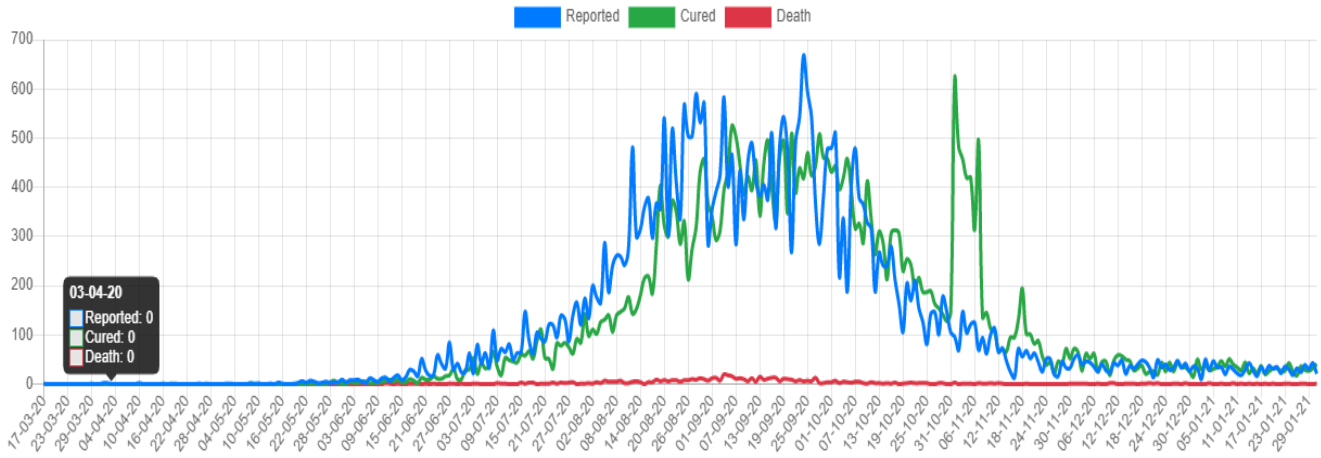


Fig-4 Date-wise COVID-19 cases in Puducherry India



July 2020 **August 2020**

2. Proactive Response

Considering the Global situation, a group of scientists from ICMR-VCRC, in collaboration with the faculties of Anna University Chennai, monitored the day-wise COVID-19 spread in 14 countries, those are considered as employment and education hubs for India. Based on the observations, this group of scientists developed a mathematical model and predicted the possible COVID-19 spread in the country during the next 110 days. The manuscript brought out the following important message:

India has screened more than 150 thousand travellers and identified 512 COVID19 positive cases even at eight weeks of the first case reported from a traveller from Wuhan, the epicentre in China.

Though it is considered to be a slow transition from one stage to the other, the infected persons who had escaped from the net of screening at airports before this alert by the Ministry of Health must have already mingled in the communities and they are the potential threat for COVID19 transmission. As India has alerted and imposed "*Lock down*" for a considerable period of three weeks, it is likely to contain the transmission to a considerable extent leading to local epidemics at certain geographical locations.

3. COVID-19 Rapid Response Team (RRT)

In addition, the Director of the institute who reviewed this manuscript convened a meeting of the scientists and formed a "Rapid Response Team (RRT)" and asked the medical faculties of the RRT to chart out a plan of action to contain the institutional transmission of COVID-19 effectively. It is noteworthy that, these arrangements were made in VCRC, before the lock down was declared in the country.

3.1 Functional responsibility of Rapid Response Team (RRT)

A rapid response team for COVID-19 was constituted for taking important decisions regarding COVID-19, prior to announcement of lockdown on 24th of March 2020. Three functional responsibilities were entrusted to the team:
(1) Formation of a medical team to ensure practice of personal hygiene, maintaining social distance, staff surveillance through temperature monitoring, quarantine services. and treatment referral.
(2) COVID-19 Diagnostic facility establishment: Preparatory activities for SARS-CoV-2 RT-PCR assays
(3) Maintenance of campus cleanliness/hygiene, safe disposal of used masks, and provision of catering services to the staff during the lockdown period.

4. Early containment measures

Following the first meeting on 21-03-2020, the medical faculties of the RRT drafted the containment plan in mission mode. It was decided to implement containment on the foundation of
(1) Situation analysis in Puducherry Union Territory
(2) Display of awareness messages on the dash board on daily basis at the reception area of the institute
(3) Close monitoring of the staff for early detection of suspected symptoms and their treatment
(4) Home-quarantine of the staff with mild symptoms
(5) Universal and COVID-19 safety measures
(6) Identification of the potential sites for SARS-CoV2 viral transmission
(7) Additional protective measures for the COVID-19 laboratory personnel and drivers
(8) Timely advocacy with periodical reviews and
(9) Proper documentation of the events

4.1 Containment Communications

Flex board on do's and don'ts was placed in the office entrance to create awareness among the staff members. Proper hand-washing demonstration posters were displayed in different locations of the institute. Posters on social distancing and proper utilization of the lifts were also displayed. A WhatsApp group was created for RRT for the daily update: One public health specialist (Scientist-B) provided updates on COVID19 cases in the country and also in Puducherry, the neighbouring State of Tamil Nadu and strategies announced by the MoH&FW. Two Section Officers of RRT provided information on important government orders. All the members were appraised about published research findings related to COVID. The members of the RRT appraised the day to day developments through digital and inter-personal communications.

4.2 Implementation of containment measures

Though the first case of COVID-19 was reported in Puducherry on 17.03.2020, there was no clustering of cases for the next three weeks. This gap provided an opportunity to plan the containment procedure in the institute. From the first week of April 2020 the staff nurse posted in Clinical Epidemiology and Chemotherapy unit of VCRC took up the responsibility of getting the information on daily cases and deaths. She formed a team of post-graduate students and this team effectively carried out (a) monitoring the body temperature of the staff and displaying the dashboard of the COVID-19 on daily basis. In addition, the security staff members were trained to take the body temperature of the visitors and record the same on daily basis. A visitor pass was developed for the security staff to record the symptoms and travel details of the visitors to the institute. In addition, the company representatives and supply chain staff members were restricted to the reception area of the institute (Annexure-1). All the packages received were sanitized and retained in the reception area for a period of four days before taking into the stock and distribution to the concerned department.

These activities were initiated in the campus much before the reporting of cluster of cases in Puducherry during third week of May 2020. Sanitation of office premises, restrooms, door handles, handrails etc. are being continued without any interruption till date.

Staff members, more than 60 years of age, were encouraged to work from home. In consultation with the HoDs, a list of staff members for rotation of duty was prepared immediately for the deployment during the lockdown period. Two drivers were on duty on round the clock basis on rotation. They were trained to sanitize the vehicles with 0.5% sodium hypochlorite solution.

Body temperature with infrared thermal gun was recorded for all the staff members including the project staff, scholars and students every day in the morning at the time of reporting for the duty. Staff who visited or returned from other districts / containment areas were home-quarantined on the advice of the medical team with reference to the containment zones announced by the district administration. Anyone who attended functions/social gatherings were home-quarantined irrespective of their place of visit.

Providing disposable masks for all the staff members on long-term basis is a costly affair. Therefore, staff members were encouraged to stich their own washable face mask. Two lady staff members volunteered to make, hand stitched cloth masks for those who were in need. In addition, to that, reusable face-masks stitched by the lymphoedema patients attending VCRC clinic, were made available for the house-keeping staff.

Separate red-bins were placed in each floor for the safe disposal of used face-masks. All these masks were daily collected and incinerated by the Puducherry State biomedical waste corporation.

Director held virtual meetings periodically with all the three field stations in different States including one research projects review meeting. When the Government announced functioning of the offices in full strength, RRT circulated an exclusive institutional advisory to all the staff members to follow safety measures to prevent COVID-19 transmission during the local travel between home and office.

4.3 Early initiation of home-quarantine

ICMR-VCRC being a part of the Department of Health Research continued its skeletal activities even during the strict lockdown period. Advocacy and implementation of home-quarantine was based on three categories of the person:
(1) Those with symptoms of respiratory illness and other suspected COVID-19 symptoms,
(2) Contact with COVID-19 suspected and positive cases and
(3) Persons with travel history during the lockdown period.

The staff members were encouraged to report, if they had symptoms similar to that of COVID and three medical officers closely monitored the staff if they had any symptom/. The first group of staff members with suspected symptoms and contacts were home-quarantined during first week of April 2020. It is to be noted that the first notification from Ministry of Home Affairs under Disaster Management Act was issued on 15th April 2020. However, in VCRC home-quarantine was implemented even before that. The details of the first group of quarantine are given in table-1.

Table-1 First set of people who were advocated home-quarantine at ICMR-VCRC

Age/ gender	Designation	Stay at Home	Symptoms	Treatment
32 / Female	Project Asst.	Up to 03-04-2020	Fever, headache, myalgia, cough	Erythromycin, Doxycycline, Paracetamol, Cetirizine
35 / Male	LDC	Up to 03-04-2020	Fever	Paracetamol
54 / Female	Lab Asst.	Up to 02-04-2020	Myalgia,	

4.4 Continuation of home-quarantine

From April 2020, home quarantine was continued even after lockdown release-4. Staff members with more than two suspected symptoms were referred for RTPCR confirmation. Staff members with one or two symptoms were kept under observation and reviewed after 48 hours. The duration of home quarantine was decided based on the symptoms evaluation and RTPCR results. Those who were RTPCR positive, those belonging to the vulnerable groups and those who were having co-morbidities were immediately admitted for institutional follow-up and others were closely monitored under home quarantine for the respiratory rate, blood pressure and development of exertion dyspnoea. All the RTPCR positive cases were allowed to report for duty after minimal period of 21 days of mandatory home quarantine.

4.5 Checks at susceptible aggregations

Two major aggregations of the staff members were identified as the most potential risk factor for COVID-19 institutional transmission: (1) Tea zone (area marked for having tea, maintaining social distancing) between 10.30 and 11.00 and then 15.00 and 16 hours and (2) Lunch zone in the canteen and garden area. From 20/04/2020 tea was served in open area and lunch zone was split to five locations, Semi Arch Hall - 2nd Floor, Room No 122- 1st Floor, Canteen - Ground Floor, Garden Shed and Net washing shed. RRT advocated packed food services from the canteen so that common use of utensils could be avoided. In view of the restrictions imposed during the lockdown period, the medical group in consultation with the Chairman of the ICMR-VCRC COVID19 Response Team suggested restricted farewell to Mr. B. Kumareson, Sr. Technician-3 on his superannuation (30-04-2020). Subsequently, all the superannuation functions that followed were organized in a restricted manner.

5. Maintenance of essential services

VCRC has three facilities that require to be maintained for routine research activities or in public interest: Mosquito rearing colony, animal house and the morbidity management and disability Prevention (MMDP) clinic for the filariasis patients.

Both the mosquito rearing and animal house facilities were maintained by posting the staff on rotation. The MMDP clinic was closed. All the regular patients were informed over phone and "*Remote consultation*" was made available to them. Those suffering from ADLA received the treatment in coordination with the pharmacy in close proximity to the patient.

The office of the ICMR-VCRC functioned with all the officers from the level of Deputy Secretary (Scientist-D) with one third capacity supporting staff on rotation. A certificate was issued to those who attended the essential services during the extended lockdown period and the extended lockdown period as per the orders of the Director, in compliance with Ministry of Home affairs (MHA) orders.

6. COVID-19 clinic

A special COVID-19 clinic was setup in a separate building to cater to the health needs of the staff of ICMR-VCRC during the lockdown period. All the three medical doctors managed the clinic and their services were made available round the clock for the VCRC students, staff and the family members. A separate vehicle was reserved for carrying out COVID activities. All the private medical services were closed in the State and therefore students, all the Staff and their relatives who reported with symptoms were given treatment. All those reported respiratory symptoms and diarrhoea were monitored and if required they were home-quarantined.

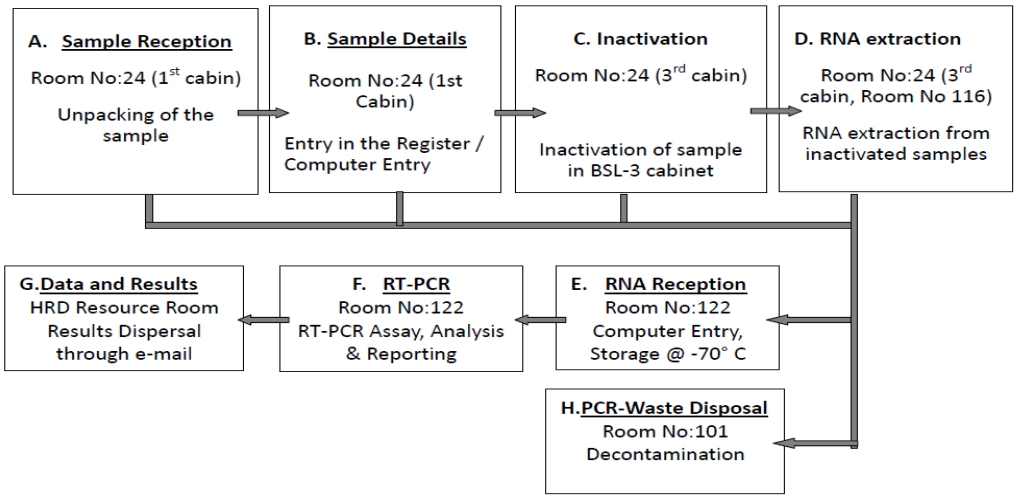
7. Co-ordination with State government

ICMR-VCRC extended its support to the State government. Four vehicles and four drivers were provided to the State Government COVID19 containment as requested by the District Collector. Medical officers of RRT interacted with DMS office to follow-up the containment activities. State Government requested for COVID testing facility by VCRC to support in the event of large community spread. In response to that a separate SARS-CoV2 diagnostic facility was initiated in a short period of two weeks by pooling the available equipment from various research laboratories of the institute.

7.1 Establishment of COVID-19 Diagnostic Laboratory

ICMR approved the ICMR-VCRC COVID-19 testing facility on 24-07-2020. Figure-5 depicts the SARS-CoV2 diagnostic testing set-up and process at ICMR-VCRC. Initially 11 staff from VCRC were identified based on their previous experiences in RNA extraction and qRT-PCR assay and tuned to the SARS-Cov2 diagnostic procedures and additional safety measures to prevent laboratory contamination and transmission. In a short span of four weeks, the centre augmented the testing for 540 individual samples every day. ICMR recommended pooling of the samples in COVID_19 surveillance when the RTPCR positivity reaches less than 3% in the sampled population. As prevalence ranged from 8% to 30%, we continued the testing on individual samples.

SARS-CoV2 Diagnostic Laboratory Set-up and Process at ICMR-VCRC



8. Accomplishments of the Proactive and Vigilant Containment

Since 23-03-2020, India had gone through six phases of lockdown: Phase 1(26 January to 29 February), Phase 2 (1 March to 22 March), Phase 3-Lockdown 1 (23 March to 14 April), Phase 4- Lockdown 2 (15 April to 3 May), Phase 5-Lockdown 3 (4 May to 17 May) and Phase 6 (After 17 May). The institute functioned in full strength from fourth week of April 2020. Vulnerable groups including two pregnant women were protected. All the faculties including the visiting faculties were able to conduct online lectures for the M.Sc. (Public Health Entomology) students. PhD scholars continued their thesis work uninterrupted. We continued our research activities negotiating to the situation. Five concept notes on COVID-19 in the broad research areas of community preparedness, childhood manifestations, susceptibility in hypertensive, effect of ivermectin and spatial distribution of COVID-19 in India. Work-from-home concept was favourably exploited and several pending manuscripts were completed and cleared. Four manuscripts on COVID-19 were prepared and submitted to the relevant journals.

Through proactive and vigilant containment, we achieved near zero-level institutional COVID-19 transmission. Though about 15 staff members developed one or two symptoms such as fever with myalgia, none of them suffered from symptoms for an extended period. To confirm this, four of the exposed to positive cases, three of the laboratory staff and two of the staff with mild symptoms were tested by qRT-PCR assay and found to be negative.

9. Source tracing of the infected

During the long lockdown period of more than seven months, eight staff members tested positive for SARS-Cov-2 by qRT-PCR assay. Among these, three of the staff were exposed to the neighbourhood contact within the campus or next door, four were travel related (two at Koraput, Odisha and one was exposed during ante-natal follow-up at Madurai. However, transmission from these infected to the other staff members and their family members could be contained by effective safety measures.

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Malaria elimination in a *falciparum* hyper endemic district of Odisha State

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Many malaria endemic countries have moved forward from malaria control to elimination in the last decade (WHO, 2018). India, with a population of 1.3 billion people has the fourth highest malaria burden in the world and was the only country to have reported a reduction in malaria cases (22.3% in 2017 compared to 2016) (WHO, 2018). In 2016, India has unveiled a national framework for malaria elimination (NFME) during 2016–2030 (NFME, 2016). The NFME provides a road-map to achieve the target of ending malaria in 571 districts out of India's 678 districts by 2022 and in the remaining districts by the year 2027. Despite an ambitious plan to eliminate malaria in India as per timeline, many high burden States are looking for new strategies to accelerate the pace of malaria elimination. Among the 36 States/UTs of India, Odisha, a part of east-central India has been the worst affected due to persistently high incidence of malaria as this State alone has contributed nearly 30% to the total malaria cases, >45% to the total *Plasmodium falciparum* cases and 15 to 30% to the deaths reported in India during 2008 to 2017 (NVBDCP, 2020).

Of the total thirty districts in Odisha State, Koraput is predominantly inhabited by the ethnic tribes. The population of the district was 1,493,912 in 2020 residing in 2028 villages. To this, 51% was contributed by different ethnic tribes and are widely spread throughout the district especially in the rural areas and are severely affected by malaria. Malaria has been hyper-endemic in the district and majority (95%) of the infections were due to *P. falciparum* (Sahu et al., 2019). The transmission of malaria is perennial with a distinct peak during July-August corresponding to rainy months (Gunasekaran et al., 2019). The Koraput district is extremely vulnerable to **malaria** transmission due to excessive and prolonged rainfall. The other favourable factors like presence of hilly terrains, deep forests with perennial streams, rainfall, conducive humidity, difficulty in accessing the remote and hilly villages and prevalence of efficient Anopheles mosquito vectors; *Anopheles fluviatilis* and *An. culicifacies* are also contributing to the persistent malaria transmission in the districts (Sahu et al., 2017). The annual parasite incidence (API) of the district during 2008-2017 varied from 17.7 to 36.7 with 61 deaths due to malaria (Source: Office of the Chief District Medical & Public Health Officer (CDM & PHO), Koraput).

During 2017, the Odisha State Govt. have made unprecedented efforts to fight against malaria by introducing twin interventions in vast areas of the State. These two new interventions included intensified distribution of long-lasting insecticidal nets (LLINs) (11.13 million) in 17 high endemic districts and ''Durgama Anchalare Malaria Nirakaran'' (elimination of malaria in inaccessible regions), in short DAMaN (Pradhan et al., 2019). Currently, LLINs have become a leading tool for malaria control in the State. The DAMaN project launched in high malaria risk areas of 24 districts covering around 1.6 million populations to detect both asymptomatic and symptomatic malaria cases in

inaccessible areas using bivalent rapid diagnostic test (RDT) and treating the malaria positive cases with recommended anti-malarial drugs through camp mode, twice a year (Pradhan et al., 2019). The plan also focuses on vigorous health awareness campaigns and community mobilisation activities for up-scaling the use of LLINs.
However, the impact of combination of LLIN +DAMaN on the reduction of malaria morbidity in Odisha State during 2017 and 2020 has not been fully understood. Therefore, the impact of LLIN+ DAMaN on reduction of malaria morbidity from 2016 to 2020 was particularly analysed in Koraput, a hyper endemic *falciparum* malaria district in Odisha State, as a case study.

Introduction of new tools for malaria elimination in Koraput district: During July-August 2017 a total of 837,435 LLINs (Duranet® (aplhacypermethrin treated net) and PermaNet 2.0 (deltamethrin treated net) were distributed to cover the entire population (n=1,476,356) of Koraput district (Source: CDM & PHO Office, Koraput). The first phase of DAMaN to screen and treat asymptomatic cases was to be carried out prior to the monsoon during April–May and the second phase during September–October 2017. However, during 2017, the first phase of DAMaN could not be conducted in pre-monsoon season and only the second phase was conducted. Both the rounds of DAMaN were carried out as per schedule through 2018 – 2020.

Collection of malaria data: We have collected malaria data of five years (2016-2020) from the CDM & PHO Office, Koraput for the entire Koraput district (latitude 180 82' N and longitude 820 72' E) where the LLIN distribution and DAMaN programme was implemented. Out of the total 307 SCs of 14 CHCs in Koraput district, the DAMaN programme was introduced along with LLIN in 5 CHCs targeting a population of 64,795 in 442 villages under 75 SCs in 2017. In 2018, both DAMaN and LLIN distribution was extended to 101 SCs of 7 CHCs covering a population of 80,941 in 590 villages. In 2019, this was extended to 105 SCs of 7 CHCs covering a population of 82,539 in 603 villages and the programme was further extended in 2020 to 115 SCs of 8 CHCs, covering a population of 119, 034 in 699 villages.

Impact of DAMaN +LLINs on malaria prevalence in Koraput district: The mean slide positivity rate (SPR) in DAMaN + LLIN villages was 11.7 during the first survey of DAMaN in 2017. A total of 13031 malaria positive cases were detected during seven rounds of DAMaN out of which, 11269 (86.4%) cases were asymptomatic. Among all the positive cases, 12661 (97.2%) were *P*. *falciparum* and remaining 2.8% were *P*. *vivax*. The SPR was significantly reduced to 1.9 in 2018 ($p < 0.001$), 1.1 in 2019 ($p < 0.001$) and 1.1 in 2020 ($p < 0.001$) after intervention.

Impact of DAMaN + LLINs on malaria incidence in Koraput district: The monthly malaria parasite incidence (MPI) recorded in Koraput district during January 2016 – December 2020 is given in Fig. 1. The MPI varied from 1.1 to 6.5 during the pre-intervention period (January 2016-August 2017), and the same ranged between 0.1 and 1.2 after the intervention (September 2017-December 2020). Overall, there was 15.2%, 84.4% , 89.5%, 91.9% decline of API

in the district during 2017, 2018, 2019 and 2020, respectively compared to 3537 malaria cases reported during2020 (API:2.4), 4619 in 2019 (API: 3.1), 6800 in 2018 (API: 4.6), 37,155 in 2017 (API: 25.0) and 42,847 in 2016 (API: 29.5)(Table 1). API from 2017 to 2020 were significantly reduced compared to 2016 ($p<0.001$).

As per the WHO recommendation, an effective intervention is necessary to accelerate the malaria reduction in endemic countries (WHO, 2017). The use of LLIN has been found to be an effective tool to prevent malaria transmission in many epidemiological settings, and has been employed currently as a major vector control intervention in India. Universal coverage and use of LLINs have been suggested to attain the goal of malaria elimination (Animut and Lindtjorn, 2018). In 2017, a total of 11.13 million LLINs were universally distributed in the 17 high malaria endemic districts of Odisha State which reduced 89.9% of malaria cases in the State within a period of three and half years which has boosted the malaria elimination programme in the State. In Koraput district alone, after the universal distribution of 837,435 LLINs in July and August 2017, the malaria incidence in the district has been reduced significantly by 91.9% in 2020.

However, in addition to the LLINs, the State has also initiated in parallel DAMaN programme which was introduced during second half of 2017. Around 1.6 million populations residing in high malaria risk areas of 24 districts of the State were subjected to mass screening for malaria under DAMaN project. All the malaria positive cases were treated with antimalarials and supervision for vector control measures was intensified. Government of Odisha showed political commitment by providing resources. In DAMaN programme, a total of 11, 269 asymptomatic malaria cases were recorded and treated during seven rounds undertaken in 2017-2020. In all the four years, a significant level of reduction in malaria incidences was observed after intervention. The evidence is thus established in the current analysis that DAMaN intervention could reduce the asymptomatic parasite reservoirs in the community.

One of the reasons for obtaining significant reduction in malaria incidence in the district is that the major malaria vector of the district, *An. fluviatilis* is susceptible to synthetic pyrethroids (SPs) (Sahu et al., 2019) and when this insecticide was used judiciously, the density and other entomological factors of susceptible vector affected drastically resulting in the significant reduction on malaria incidence (Kumar et al., 2018). Both the population of *An. fluviatilis* and *An. culicifacies* in the current study area predominantly bite indoors (Sahu et al., 2017). Coverage by LLINs (>95%) was high in entire Koraput district with >80% use rate consistently (Source: CDM & PHO Office, Koraput) might reduce the number of blood-feeding mosquitoes and prevent man-vector contact in the district (Kumar et al., 2018).

Therefore, in areas that are inaccessible and with high intensity of active transmission, it was quite reasonable for the control programme to implement combination measures (LLIN + DAMAN) as a special strategy for interrupting

transmission at a faster rate as mass blood survey and treatment would liquidate the parasitic load especially asymptomatic carriers in the community and LLIN coverage would reduce/prevent man-vector contact.

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Table 1. Reduction of Malaria Incidence in Koraput district

Year	API (No.of cases)	% of API reduction and cases averted from previous year	% of API reduction and cases averted from base year 2016
No.of SCs	307	-	-
Population (2020)	1493912	-	-
2016	29.5 [42,847]	-	-
2017	25.0 [37,155]	15.2% [5,692]	15.2% [5,692]
2018	4.6 [6,800]	81.6% [30,355]	84.4% [36,047]
2019	3.1 [4,619]	32.6% [2,181]	89.5% [38,228]
2020	2.4 [3,537]	22.6% [1,082]	91.9% [39,310]

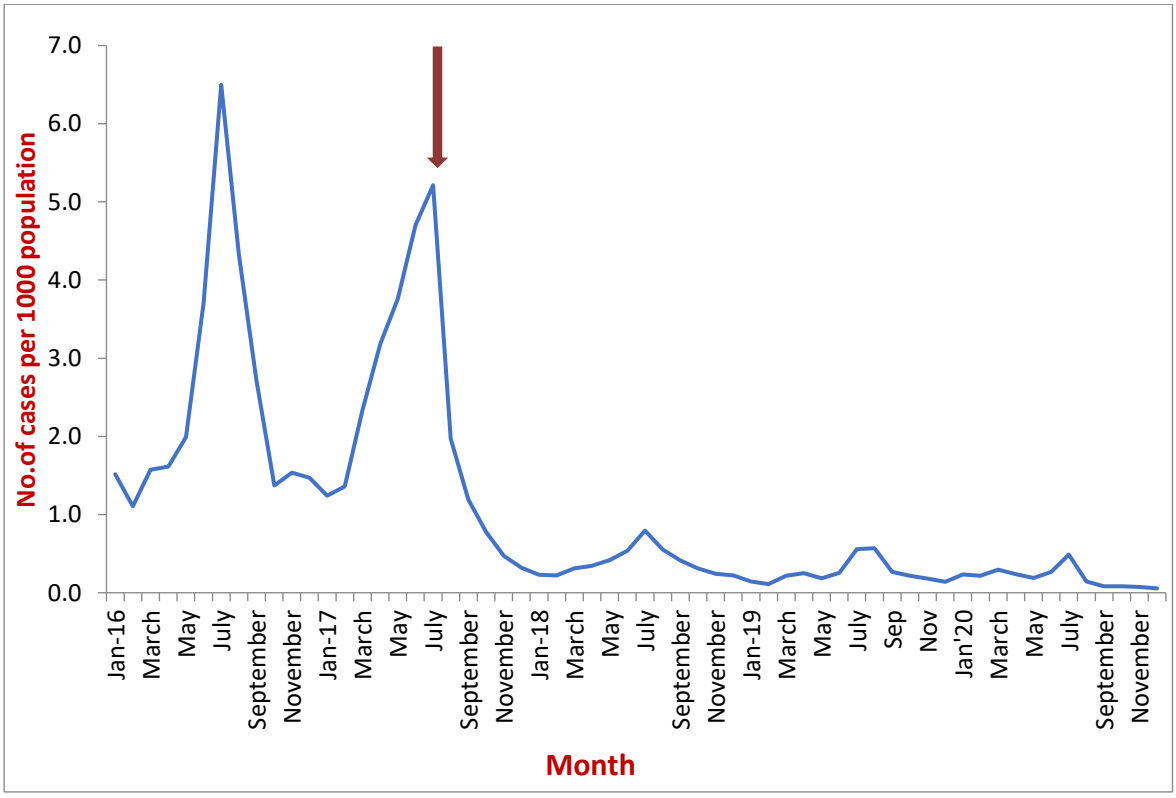

Fig.1. Monthly malaria parasite incidence in Koraput district

RNA binding proteins (RBPs): the regulators of post transcriptional gene expression, in *Aedes aegypti*

Dr. Bhavna Gupta and Dr. R. Paramasivan, ICMR-VCRC Field Station, Madurai (TN)

RNA binding proteins (RBPs) as the name suggests are the proteins that bind RNAs and control several aspects of the RNA life cycle starting from synthesis to decay. RBPs interact with pre-mRNA and with the help of cis-regulatory elements regulate RNA processing, transportation, localization, RNA stability, RNA sequence modification, translation and finally degradation[1] (Figure 1). Some RBPs bind RNA during transcription and remain bound throughout its lifespan whereas others bind only at specific point to regulate particular function[2]. The role of RBPs in RNA biology has been aptly described as; RNA writers, readers, editors and erasers[3]. RNA writers are the RBPs that control RNA processing (splicing factors, capping and polyadenylation), RNA readers help in subcellular localization and translation (initiation factors), RNA editors are the RBPs that edit RNA sequences (methyltransferases and deaminases), and finally the RNA erasers lead to instability and degradation of the RNAs (destabilizing factors and nucleases)[3]. This process of controlling the different aspects of RNA biology is known as post-transcriptional regulation (PTR) and RBPs are the major players in PTR. The extensive research in RBPs in the recent past has revealed that RBPs comprise a major part of the proteome in the eukaryotes' and regulate cell differentiation and homeostasis in response to different developmental stages, environmental challenges and disease/infections[4–6]. For example, the mutations and dysregulation in several RBP genes have been significantly associated with different types of cancers[4,6].

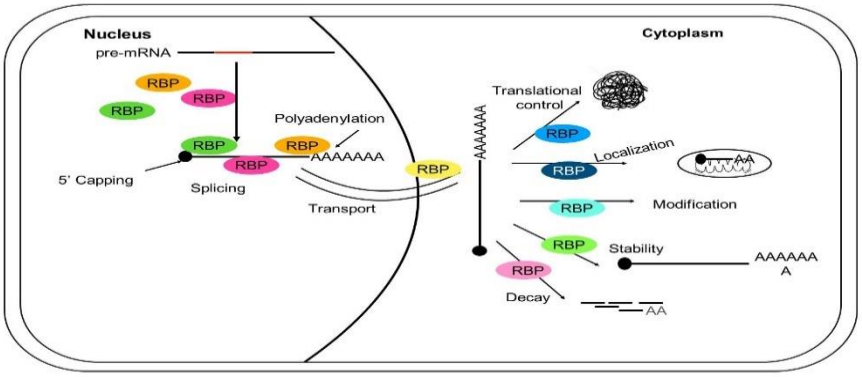

Figure 1. Schematic representation of different stages of mRNA life cycle regulated by RNA-binding proteins (RBPs) both inside and outside the nucleus.

RBPs interact with RNAs using specific sequences which are known as RNA binding domains (RBDs). These domains help RBPs to locate and bind the specific target and perform regulatory functions. A single RBP can have one or more number of RBDs that increases specificity and affinity of the RBP to recognize longer stretches of RNA[2]. Besides RNA binding domains, RBPs can also contain domains for interacting with other proteins (protein-protein interaction) and for enzymatic activities. There are more than 40 RBDs known, of which the best characterized are RNA Recognition Motif (RRM), K-homology (KH), zinc finger, double stranded RNA-binding domain and PUF domain. The RRM is the most abundant and widely characterized among all the organisms'[7]. RRM domain is typically ~90 amino-acid long and contain two structurally conserved short sequences, named as RNP1 (RNP octamer) and RNP2 (RNP hexamer).

Here, we will be discussing about the RRM containing RBPs in *Aedes aegypti*. Itis the mosquito species that transmits several viral pathogens such as dengue, Chikungunya, ZIKA etc. RBPs in *Ae. aegypti* are getting wider attention due to their possible role in regulating viral pathogens (as they are RNA viruses) replication and survival[8,9]. Several mosquito RBPs have been identified playing crucial role in viral replication, expression and translation [8,9] and thus are the targets for anti-viral therapies. Despite their relevance, the repertoire of RBPs in *Ae. aegypti* has not been characterized.

Using a multi-pronged *in-silico* approach; we screened the whole genome of *Ae. aegypti* and identified 151 genes having RRM domain. Forty-eight of the total 151 genes were having a single RRM domain, and 48 were found with more than one RRM domain. Rest of the 55 genes contained RRM domain along with other types of domains including KH, Zinc finger, PWI, La, G-patch etc. Gene Ontology (GO) analysis with BLAST2GO identified biological and molecular functions of the genes. Among molecular functions, as expected, 'RNA binding' was the most enriched terms associated with RBPs. In biological processes, enriched terms included 'regulation of gene expression', 'nucleic acid and protein metabolism', 'cellular component assembly', 'protein containing complex', 'protein modification', and 'ribonucleoprotein complex' indicating the role of RBPs in variety of biological processes.

Further, in order to infer the functional and evolutionary relationships among 151 RRM containing RBP genes, we performed multiple sequence alignment and constructed a phylogenetic tree using maximum likelihood method. The phylogenetic relations between the RBP genes were not found straight forward. However, roughly, the RBPs were grouped partly according to the domain architecture and partly based on the putative functions (Figure 2). It is, however, important to mention that many RBPs perform multiple functions and contain several domains of different evolutionary origin. This could hinder the clear inference of phylogenetic relations when all the genes are analyzed together.

We also performed digital expression analysis of publically available RNAseq data[10] that was generated from 42 different stages of *Ae. aegypti* life cycle. Several RBPs showing differential patterns of expression were identified, especially in the early embryonic stages (0-2hr embryo and 12-16 hr embryo) and in blood fed females. From proteomics data published by Marinotti et al[11], two RBPs (Protein ID: AAEL0010665 and AAEL0013869) were found associated with *Ae. aegypti* eggshell. This indicates the possible role of RBP genes in different developmental processes/stages of *Ae. aegypti*.

For such RBPs, we intend to carry out in-depth functional analysis to gain greater insights and envision that it will give us several interesting leads for further exploration. Moreover, the interactome capture from the different developmental stages of mosquito could identify important proteins that could be the targets for developing novel molecules or growth regulators for mosquito control.

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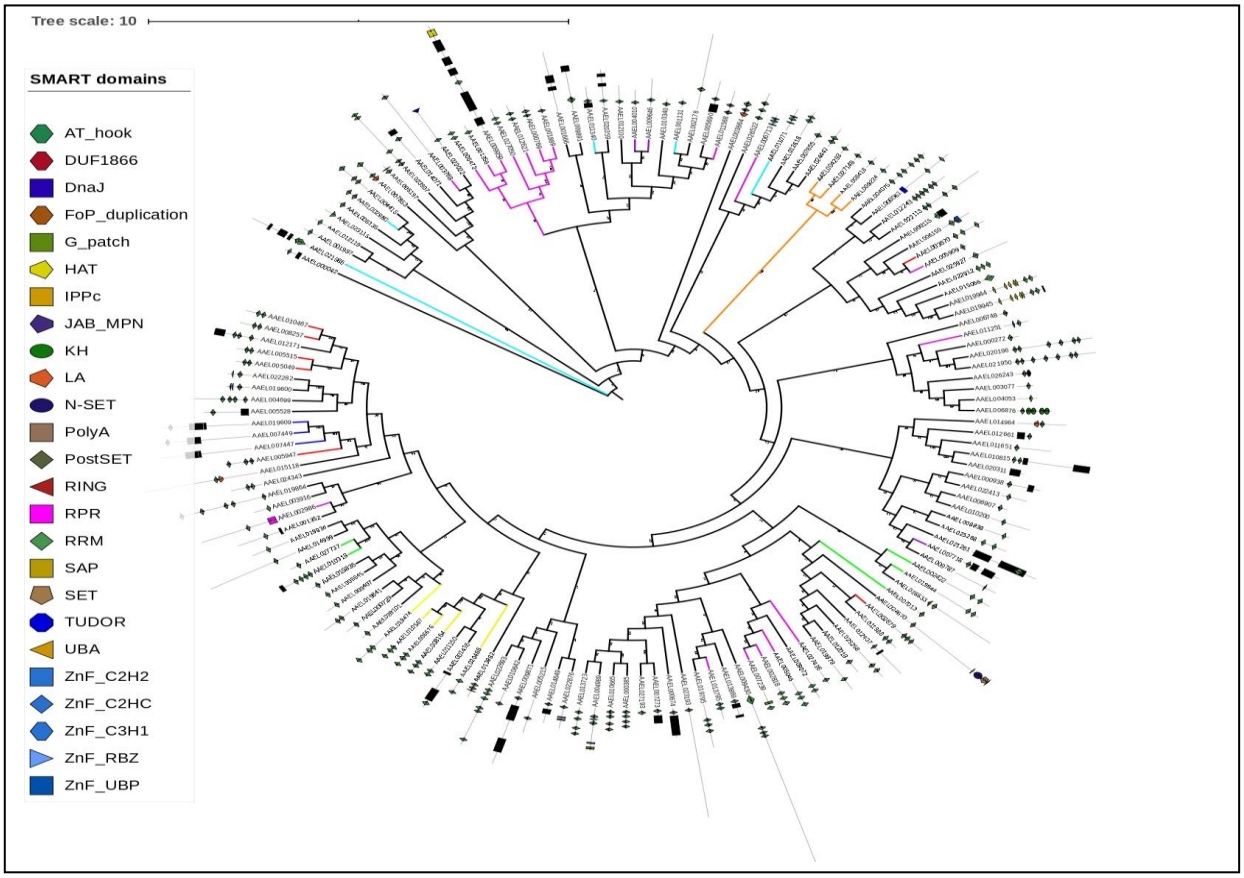

Figure 2. Maximum Likelihood (ML) tree of 151 RRM containing RNA binding proteins in Aedes aegypti using 100 bootstraps. The values shown on the branches are the bootstrap values. Each branch is labelled with the protein ID and the domain architecture of each gene. The colour on the branches indicates some of the well-known RNA-binding protein genes, Red: heterogeneous nuclear ribonucleoproteins, Blue: Gawky proteins, Pink: splicing factors, yellow: ELAV like proteins, Green: Polyadenylate binding proteins, purple: eukaryotic transcription initiation factors, Orange: transformer proteins, Sky-blue: small nuclear ribonucleoproteins.

Student's Section

Sand-fly Borne Pappataci Fever - an overview

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Introduction

Vector borne diseases are transmitted by the bite of insects, especially mosquitoes, ticks, mites, sandflies and black-flies. Among them, sandflies are the insects of great medical and veterinary importance as they are the major vectors of both Leishmaniasis and Sand-fly fever. This article is an overview of sand-fly fever. Sand-fly is a colloquial name for any genus or species of flying, biting, and blood sucking dipteran encountered in sandy areas. Sand-fly fever or *pappataci* fever is a vector borne febrile disease transmitted by the bite of *Phlebotamine* sandflies called as Phlebotamine fever or 3 - day fever. The name *pappataci* fever comes from the Italian word for sandfly, "pappa" means food and "taci" means silent. Generally, the infection is caused by *phlebo*virus serotypes belonging to the family *Bunyaviridae*. The occurrence of this disease is more prevalent in summer season during which sandflies are very active.

Distribution of the vectors and the disease

The *Phlebotomus* vectors occur in southern parts of northern temperate region, especially the Mediterranean region to central Asia, and in tropical areas. Most *Phlebotomus* species are found in semi-arid and savanna areas in preference to forests. *Sergentomia* species being found mainly in Indian sub-region, sub -Saharan Africa and Asia.

The disease occurs in Mediterranean region, but it also extends up the Nile into Egypt, and from Middle East to northern India, Pakistan, Afghanistan, and China.

Vector

Pappataci fever is transmitted by the bites of Phlebotomine sandflies (Fig.1) of the order Diptera, family *Psychodidae*, genus *Phlebotomus spp* (*P. papatasi, P. perniciosus, P.sergenti, P.argentipes, P.ariasi*). They are small insects having the length of about 1.5-3.5 mm, and their body and wings are densely covered with hair. Sandflies are distinguished from other insects by which their wings can extend at an angle of 40◦ over the body during rest or during blood feeding. Female sand-flies can transmit viruses via horizontal virus transmission from man to sand-fly, and can be transmitted transovarially from an infected female sand- fly to its offspring. Only female sandflies feed (0.1-1.0 µL) blood for oviposition. They usually lay eggs in dark and humid animal burrows, crevices of trees, pits and under dead leaves. They are more likely to move by hopping than flying. They cannot fly generally more than three feet above the ground.

Life cycle

The developmental stages of sandflies include 4 stages, the egg, larva, pupa and adult (Fig.2). Female sand flies usually lay 30-70 eggs during a single gonotrophic cycle and it will hatch after 4-20 days. Larval development consists of four instars and is completed within a period of 20-30 days depending up on the *Phlebotomus* species suitability of their environmental conditions. Larvae are mainly scavengers, feeding on organic matter (e.g. fungi, decaying leaves, animal faeces and decomposing arthropods). The pupal stage will last for about 6-13 days, with pairs of caudal bristles which aid in the identification of phlebotomine pupae. Finally, the adult flies emerge out. To complete the life cycle, from oviposition to adult emergence it takes about 30-60 days.

Feeding behaviour of adult sandflies: *Phlebotomus* male and female flies feed on plant juices and other sugary secretions from plants. In addition, female flies also feed on blood of rodents, avian, humans and other animal groups for oviposition.

Pathogen: Sand-fly viruses are heterogeneous group belonging to family *Bunyaviridae*. The causative agents of this infection are mainly due to the three serotypes of *phleboviruses* such as Naple, Sicilian and Toscana virus. The viruses are very small in the size of 90-110 nm, spherical in shape and are enveloped RNA viruses. The RNA is arranged in three uneven negative sense strands named as small (S), medium (M) and large (L) encoding nucleoproteins, glycoproteins, and RNA polymerase respectively. In addition, the smaller segment codes for non-structural proteins.

Disease: Symptoms

After a few days of infective bite of sandflies, abdominal distress and chill develop followed by fever. Most of the symptoms of infections are self-limited with fever, headache, nausea, muscle, joint and abdominal pain. In some cases, rapid heart rate can occur.

Diagnosis: The laboratory diagnosis is done by RT - PCR for the direct detection of the virus. Serologic testing methods such as IgM/IgG ELISA, neutralizing assays are carried out for confirmation. Also, viral isolation from blood or CSF can be done using mammalian cell lines.

Treatment: As the disease is self-limiting and no fatalities reported, there is no specific treatment for sand-fly fever. Analgesics as well as relief medicines are prescribed by physicians. Interferon - α and ribavirin have been used against viruses of *Bunyaviridae.*

Prevention and control: No vaccination has been developed so far to prevent sand-fly fever. However, the prevention of sand-fly biting can be by the use of effective repellents. Use of insecticide impregnated bed nets can prevent the entry of these tiny flies. Personal protective measures, especially in the case of travellers in high endemic areas may consider treating their clothes with permethrin.

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Fig. 1

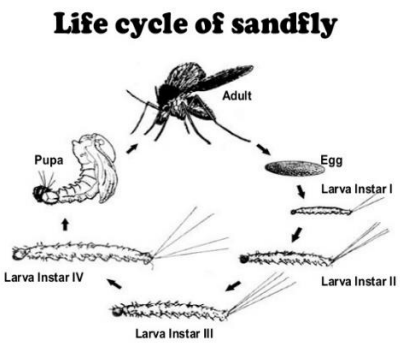


Fig. 2

Fig.1-Adult sand-fly (Source: https://www.ecdc.europa.eu/en/disease-vectors/facts/phlebotomine-sand-flies)
Fig.2- Life cycle of sand-fly (Source :https://www.slideshare.net/jamesmacroony/entomology-louse-bedbugs)

Human Resource Development

Dr. V. Vasuki, Scientist-E, ICMR-VCRC, Puducherry, India

In tune with the National Water Mission's (NWM) campaign **"Catch the Rain"** and *vide* UGC circular dated 24th June 2020 the following activities were undertaken by students pursuing M.Sc. Public Health Entomology course at this Centre.

Operational rain water harvesting system (RWHS) along with its components are in place in the respective areas within the campus. There are 4 pits, each of which measures 1.21 cubic metres and 1 pit with 5.16 Cu. metre and 1 lengthy pit of 5.16 Cu. metre located near the outlet pipes, which collect rainwater from the terrace of the office building. We envisage to have in place 10 more RWHS within as per the CPWD specifications during the current academic year.

The campus has two bore wells and one corporation water connection catering to the needs of the laboratories and personnel including students. The staff along with other personnel judiciously use water, for instance among the two bore wells, water from one bore well alone is being used along with corporation water.

Students of M.Sc. Public Health Entomology establishing the rain water harvesting system

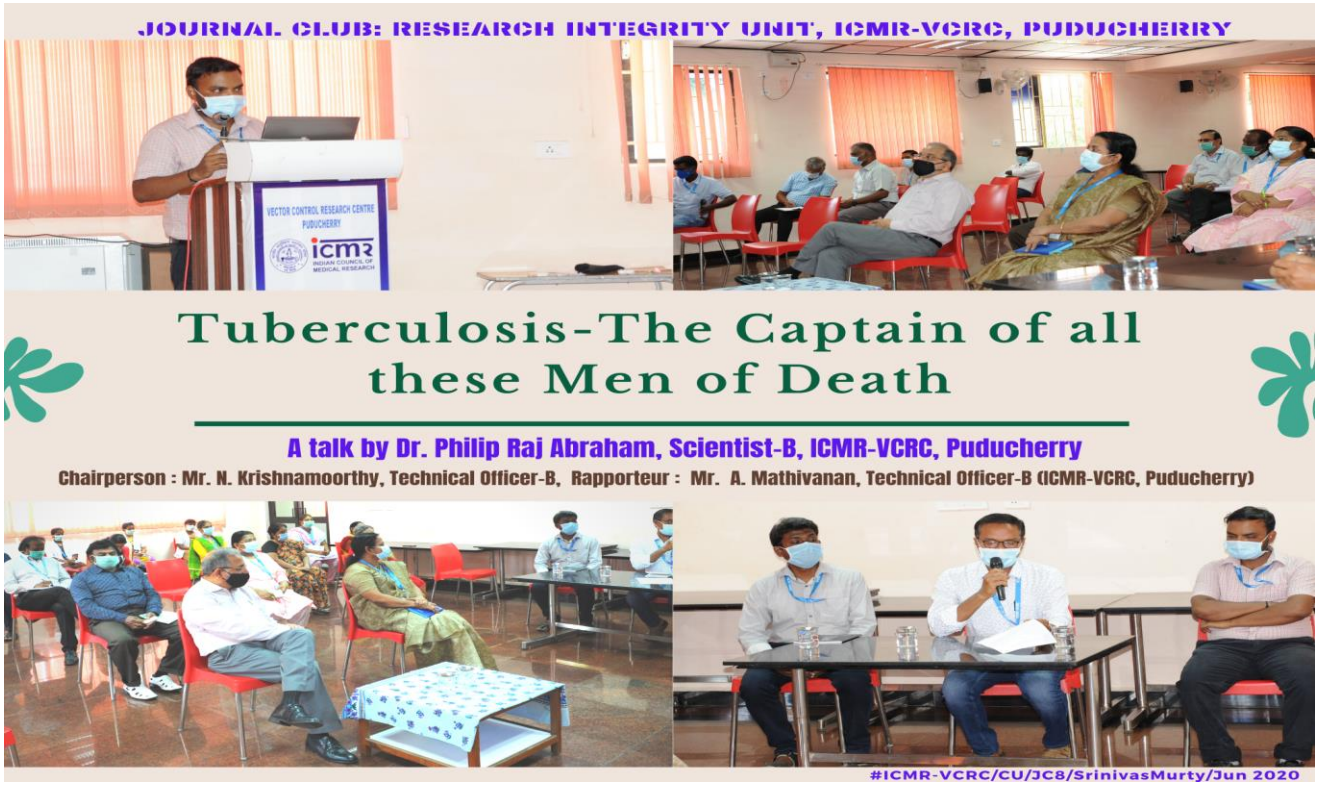
Social Media and Communication Network
Dr. Ashwani Kumar, Dr. Nisha Mathew, Dr. Suchi Tyagi, Dr. A. Krishna Kumari, Mrs. S. P. Pramukha & Mr. Y. Srinivas Murty, ICMR-VCRC, Puducherry, India

A Communication unit was initiated by the ICMR to showcase the various research and non-research activities taking place in the different research institutes under ICMR on the social media platforms such as Facebook, Twitter & Instagram. During the past 6 months, from July 2020 to December 2020, the Communication unit of ICMR-VCRC produced and shared 79 posters, one documentary movie on Covid-19, and 4 videos in the social media. The following are the posters of some of the activities displayed in the social media.

Journal Club Meetings under the *aegis* of Research Integrity Unit (RIU)

1. Lectures by ICMR-VCRC Scientists and Technical Officers

The VCRC journal club organizes lectures by the VCRC scientists and Technical officers every month, Dr. Philip Raj Abraham, Scientist – B, delivered a lecture on "Tuberculosis-The captain of all these men of death". The Technical session was presided over by the Chairman of the unit



2. Blood Donation camp "DONATE BLOOD & SAVE LIFE"

Blood donation, is a philanthropic act, which can bring a life back to power during the ongoing COVID-19 pandemic. With the high motivation from the Director, Dr. Ashwani Kumar, ICMR-VCRC, a blood donation camp was organised in association with the help from JIPMER, Puducherry on 31st July 2020 by following precautions as per SOP guidelines. A total of 33 interested donors including the Director, Staff and Students of the centre voluntarily participated in the camp and donated blood for a noble cause.

3. Felicitation to Staff of VCRC for their completion of 25 years of service in the Council

On the occasion of the 45th annual day celebrations of ICMR-VCRC, Puducherry on 7th August 2020. The Director, honoured the staff who had completed 25 years of service in ICMR -VCRC, with a memento and a certificate

A memorable moment for 72 employees who completed 25 years of service in the council.

4. Virtual 45th Annual Day Celebration at the Centre

The 45th ICMR-VCRC annual day celebrations were held through virtual mode on 6th August 2020.On this solemn occasion, Padma Shri Prof. Balram Bhargava, Secretary, DHR and Director General, ICMR released documents of ICMR-VCRC viz., Activities & Achievements (1975 to 2020), VCRC vision (2020-2040), Patents and Products and a new newsletter titled "**Vector**" in Hindi & English bi-annual edition. Besides, Prof Bhargava launched the new web-site of VCRC. Dr. G. S. Toteja, Additional Director General honoured VCRC Corona Warriors, and Dr. G. S. G. Ayyangar, IAS, Sr. DDG (administration) complemented the employees for completion of 25 years of service in the council.

4. Inauguration of New Website of VCRC

On the occasion of the 45th ICMR-VCRC annual day *via* virtual mode on 6th August 2020. Padma Shri Prof. Balram Bhargava, Secretary, DHR and Director General, ICMR launched the new website of VCRC. A total of 67408 visitors visited the site, viewed the information within a short span of three months since the launch of the website.

5. Release of Bilingual Newsletter in "VECTOR"

Prof. Balram Bhargava, Secretary, DHR and Director General, ICMR released the Bilingual Newsletter "Vector" in Hindi and English. It is the first Newsletter in Hindi among the Central Government Institutions in the Union Territory of Puducherry.

6. Inauguration of COVID-19Laboratory at the centre

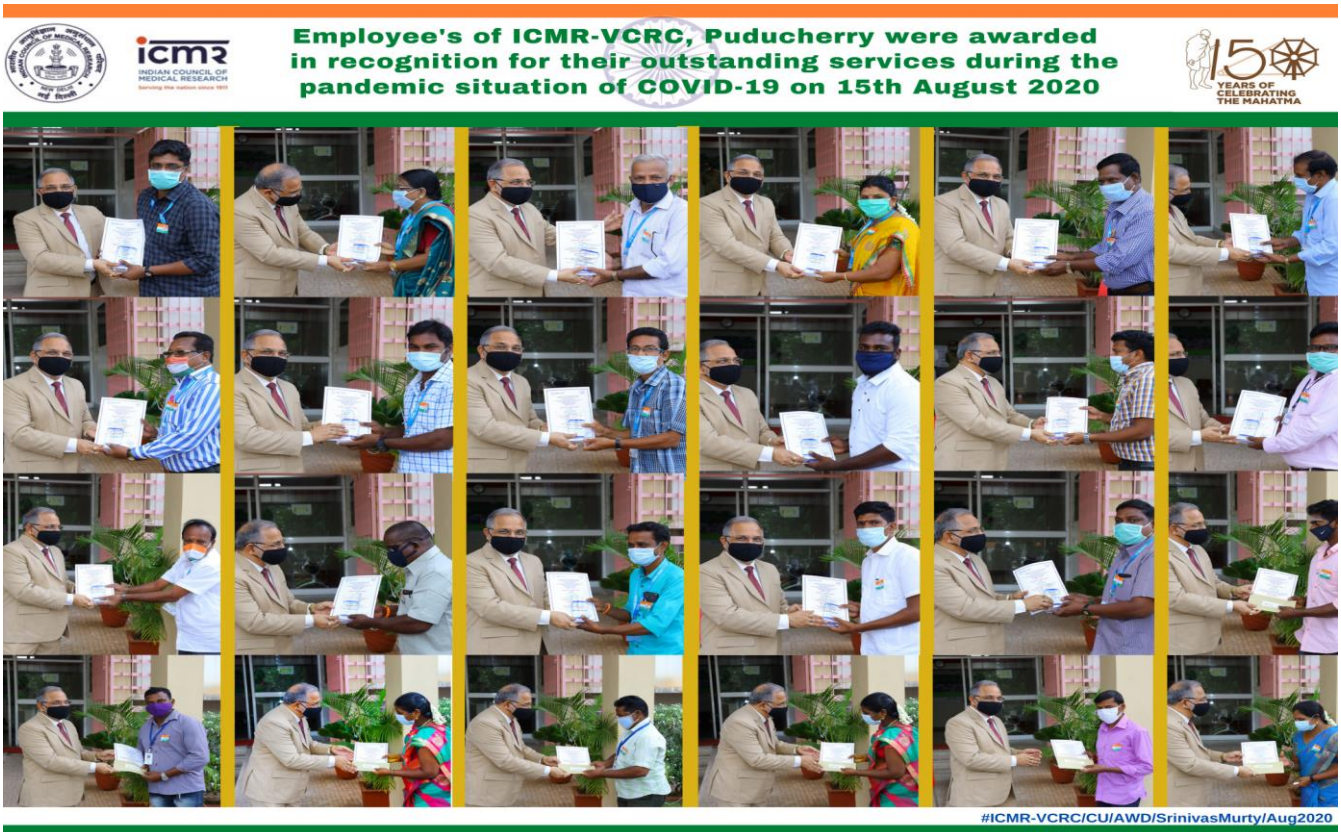
On the occasion of the 45th annual day celebration of ICMR-VCRC, Puducherry on 6th August 2020, ICMR-VCRC's COVID-19 Laboratory was inaugurated by Dr. Rakesh Aggarwal, Director, JIPMER, Puducherry

Dr Rakesh Aggarwal, Director JIPMER inaugurating the COVID-19 Laboratory

Facilities at the COVID-19 Laboratory

7. Awards for Employees on the occasion of 74th Independence Day.

On the occasion of 74thIndependence Day Celebrations, Dr. Ashwani Kumar, Director, recognized the contributions of 60 employees in various fields and exemplary services as COVID warriors during the COVID-19 pandemic.



8. Visit of Hon'ble Chief Minister and Hon'ble Health Minister to ICMR-VCRC, Puducherry

ICMR-VCRC, Puducherry is one of the recognised centres for COVID-19 sample testing. On 8th September 2020, the Hon'ble Chief Minister Shri. V. Narayanasamy and Hon'ble Health Minister of Puducherry Shri. Malladi Krishna Rao along with officials from the state National Vector Borne Diseases Control Programme (NVBDCP), Puducherry, inspected the facilities of COVID-19 laboratory and interacted with the scientists, and technical staff. They appreciated the Centre's commitment towards extending support to the State Government in the fight against COVID-19.

Welcoming Hon'ble Chief Minister of Puducherry Shri V. Narayanasamy by the Director, Dr. Ashwani Kumar

The Hon'ble Health Minister Shri Malladi Krishna Rao receiving bouquet from Dr. R. J. L. Britto, Scientist F & Head, COVID-19 Rapid Response Team, ICMR-VCRC

The Hon'ble Chief Minister & Hon'ble Health Minister inspecting the facilities of COVID-19 Laboratory

The Hon'ble Chief Minister and Hon'ble Health Minister are interacting with the Senior scientists of the Centre

9. Independence Day Celebration

On the occasion of the 74th Independence Day of India, ICMR-VCRC Director, Dr. Ashwani Kumar hoisted the National Flag at the VCRC campus and addressed the staff members. All members were instructed to maintain social distance. The year 2020 was a memorable year for 60 employees including scientists, technical, administration, drivers and sanitary workers who received certificates and mementos for their outstanding services in various fields and exemplary services as COVID warriors during COVID-19 pandemic.

10. Director participation in dengue prevention expert meeting

ICMR-VCRC Director, Dr. Ashwani Kumar, attended an expert meeting on Dengue prevention and control organized by the NVBDCP, during Covid-19 pandemic situation in Puducherry state. The District Collector and NVBDCP officials, Puducherry participated in the meeting held on 23rd September 2020.

11. Swatch Bharat Abhiyan on the occasion of Gandhi Jayanti.

On the occasion of Mahatma Gandhi's 151st Birth Anniversary celebrations, tree saplings were planted at the VCRC campus by VCRC Hygiene Committee members.

12. Dr. Ashwani Kumar, Director, ICMR-VCRC took charge as Director-in-charge, of ICMR-NARFBR, Hyderabad.

ICMR-VCRC Director, Dr. Ashwani Kumar, took over charge as Director-in-charge, ICMR-NARFBR, Hyderabad on 17.12.2020. He was received by the former Director-in-charge, Dr. P. Suresh, who introduced all the staff of ICMR-NARFBR to the new Director in charge. Dr Ashwani Kumar inspected the new building construction site and planted trees in the new building premises.

13. Curtain raiser to India International Science Festival 2020

ICMR-VCRC organised a curtain raiser to the India International Science Festival 2020 (IISF 2020), on 04. Dec.2020 from 3.30 pm to 5.00 pm at VCRC on virtual mode. Dr. Samiran Panda, Director, ICMR National Aids Research Institute (NARI) Pune, and Head, Epidemiology and Communicable Diseases, Division, (ECD) ICMR, Dr. Rajni Kant, Director, ICMR-Regional Medical Research Centre (RMRC), Gorakhpur, and Head Information and Communication Unit, ICMR , Dr. Rajpal Sing Yadav, Scientist, Vector Ecology and Management Unit, of the Dept of Control of Neglected Tropical Diseases (NTD), World Health Organization (WHO), Geneva, and Dr. Rakesh Aggarwal, Director, of Jawaharlal Institute of Post graduate Medical Education and Research (JIPMER) , Puducherry, were the invited guests for the event .

On this occasion, Dr. Ashwini Kumar, Director ICMR-VCRC welcomed the dignitaries and gave an introduction about the IISF. Dr. Nisha Mathew, Scientist F, and Nodal Communication Officer, ICMR-VCRC, gave the audience an overview of the different programmes organized as part of IISF 2020. The invited speakers, Dr. Rajpal Sing Yadav and Dr. Rakesh Aggarwal, gave enlightening speeches on the management of vector borne diseases (VBD) and COVID-19 Vaccination, respectively. Dr. Samiran Panda, Head, ECD, Division, ICMR, delivered the presidential address on behalf of the DG, ICMR. Dr. Rajanikant, Director, RMRC Gorakhpur and head of the ICMR Communication unit, gave a brief introduction about IISF 2020 and gave an account of ICMR'S participation in IISF, every year, from the time of its inception in the year 2015.

9. Events

Sl.no	Date	Event	Section/Scientist
01	15.07.2020	Institutional Human Ethics Committee meeting held at Dr. T. R. Rao auditorium	IHEC, Dr. Nisha Mathew, Scientist-F& Member Secretary
02	24.07.2020	Dr. M. Palaniyandi, Technical Officer-C, ICMR-VCRC-FS, Madurai delivered a lecture on the topic "Remote sensing, GIS application for mapping vector ecology, epidemic risk assessment and spatial predictions" - All scientific staff attended the lecture	Dr. M. Palaniyandi, Technical Officer-ICMR-VCRC-FS, Madurai
03	31.07.2020	Blood donation camp organised by ICMR-VCRC in collaboration with JIPMER, Puducherry	Dr. Ashwani Kumar, Director
04	05.08.2020	COVID laboratory was inaugurated on 5th August, 2020. The facility was inaugurated by Dr. Rakesh Aggarwal, Director, JIPMER, Pondicherry	Dr. Ashwani Kumar, Director
05	06.08.2020	VCRC celebrated its 45th Annual Day on 6th August, 2020 virtually. During this celebration, Padmashri Prof. Balram Bhargava, Secretary DHR and Director General, ICMR inaugurated the new website of the Centre and released the documents 1. VCRC Activities and Achievements (1975-2020), 2. VCRC Vision (2020-2040), 3. VCRC Patents and Products and 4. VCRC Newsletter 'Vector' in Hindi and English. The Additional Director General, ICMR Dr. G. S. Toteja honoured the VCRC Corona Warriors. Dr. G. S. G. Ayyangar, IAS, Sr. DDG (Administration), ICMR honoured the Staff members who have completed 25 years of Service and followed by felicitation address delivered by Padmashri Dr. P. K. Rajagopalan, Former Director, VCRC, Dr. P. K. Das, Former Director, VCRC, Dr. M. Kalyanasundaram, Former Officer -In-Charge, VCRC, P. Jambulingam, Former Director and ICMR Chair-Vector Biology, Directors of ICMR Institutes, Dr. Raman Velayudhan & Dr. Rajpal Singh Yadav, Dept. of NTD, World Health Organization, Geneva	Dr. Ashwani Kumar, Director
06	07.08.2020	On behalf of Dr. G. S. G. Ayyangar, IAS, Sr. DDG (administration) ICMR, Director, ICMR-VCRC honoured the employees of ICMR-VCRC on their completion of 25 years of service in the council.	Dr. Ashwani Kumar, Director
07		Dr. Prasanta Saini, Scientist B & OIC ICMR-VCRC Field Station, Kottayam, participated in the Webinar on Host-Microbe Interaction: Present and Future Perspectives organized by School of Biotechnology, Dept. of Life Science, Presidency University, Kolkata during August 6-7, 2020 and delivered an invited lecture on "Atypical manifestation of *Leishmania donovani* in the Indian subcontinent"	Dr. Prasanta Saini, Scientist B & OIC ICMR-VCRC Field Station, Kottayam, Kerala
08	07.08.2020	A tree plantation programme was organized on the occasion of ICMR-VCRC Foundation Day at ICMR-VCRC Field Station, Koraput, Odisha	Dr. S. S. Sahu, Scientist-F & OIC, ICMR-VCRC Field Station, Koraput, Odisha
09	15.08.2020	The 74thIndependence Day (15th of August, 2020) celebrations were marked by flag hoisting. During the occasion, scientists and staff were honoured for their achievements during the year 2020 and contribution during COVID19 lockdown period, also Flag hosting ceremony carried out in the Field Stations of Kottayam, Kerala, Koraput, Odisha and Madurai, Tamil Nadu.	Dr. Ashwani Kumar, Director Dr. Paramasivan, Scientist-F Dr. S. S. Sahu, Scientist-F Dr. Prasanta Saini, Scientist-B
10	10.08.2020	Virtual meeting for expert review group meeting for evaluation of Public health pesticides, Division of Epidemiology & Communicable diseases, ICMR	Dr. Ashwani Kumar, Director Dr. ManjuRahi, Scientist -F Dr. P. L. Joshi, Former Director, NVBDCP Dr. P. Jambulingam, Chair, ICMR Dr. K. Raghavendra, Scientist-G, NIMR Dr. K. Gunasekaran, Sr. Consultant Dr. C. Sadananadane, Scientist -D Dr. Kalpana Baruah, Joint Director, NVBDCP, Dr. Ram Singh and Dr. Sandhya Kulshreshtha, Consultant
11	03.09.2020	Dr. N. Pradeep Kumar, Senior Consultant, ICMR-VCRC participated in the 25th Executive Committee Meeting of the Inter University Centre for Biomedical Research & Super Specialty Hospital, Govt. of Kerala at Mahatma Gandhi University, Kottayam.	Dr. N. Pradeep Kumar, Sr. Consultant
12	08.09.2020	Hon'ble Chief Minister, Puducherry Shri. V. Narayanasamy along with the State Health Minister, Puducherry Shri. Malladi Krishna Rao visited the ICMR-VCRC COVID-19 laboratory and discussed with the Director for extension of support from VCRC to the Govt. of Puducherry	

13	14.09.2020	VCRC IBSC meeting held on 14th September, 2020	Dr. Ashwani Kumar, Director
14	23.09.2020	Director attended State Level Dengue Review Meeting on 23.09.2020 @ 4 pm at Collector's office, Puducherry	Dr. Ashwani Kumar, Director
15	02.10.2020	Artwork frame of Shri. Mahatma Gandhiji unveiled by the Director, at the reception of ICMR-VCRC building on the occasion of 151st birth anniversary of Mahatma Gandhi at the centre. Concurrently, celebrations were held at VCRC Field Stations, Kottayam, Kerala, Koraput, Odisha& Madurai, Tamil Nadu	Dr. Ashwani Kumar, Director Dr. Paramasivan, Scientist-F Dr. S. S. Sahu, Scientist-F Dr. Prasanta Saini, Scientist-B
16	02.10.2020	Tree Plantation drive at VCRC campus as a part of 'Swachh Bharat Abhiyan'& 151st Birth anniversary of Mahatma Gandhi.	Hygiene Committee Dr. B. Nanda, Scientist- C
17	09.10.2020	COVID-19 Prevention Pledge was under taken by all the employees at ICMR-VCRC, Puducherry and its Field Stations at Kottayam, Kerala, Koraput, Odisha & Madurai, Tamil Nadu	Dr. Ashwani Kumar, Director Dr. Paramasivan, Scientist-F Dr. S. S. Sahu, Scientist-F Dr. Prasanta Saini, Scientist-B
18	27.01.2020	Competition 'Out of waste' creating useful items out of waste materials in the surroundings by M.Sc. PHE students for 'Swacchta pakhwada'	Dr. V. Vasuki, Scientist- E & Coordinator, HRD
19	30.01.2020	Tree Plantation drive at ICMR-VCRC campus by Director Dr. Ashwani Kumar as part of 'Swachh Bharat Abhiyan'	Hygiene Committee Dr. B. Nanda, Scientist- C
20	19-11-2020 to 20-11-2020	Pre-Scientific Advisory Committee Meeting held Virtually, all the Scientists and Technical Officers presented news projects and reviewed ongoing and completed Projects.	Dr. Ashwani Kumar, Director Prof. A. P. Dash, SAC Chairman & VC, AIPH Dr. Samiran Ponda, Head, ECD, ICMR Dr. Manju Rahi, Scientist-F Dr. Sarala K Subba Rao, Former Director, NIMR Dr. D. A. Gadkari, Former Director, NIV Dr. Priya Abraham, Director,NIV Dr. P.L. Joshi, Former Director, NVBDCP Dr. R. S. Sharma, Former Addl. Director, CME&VC Dr. Arun Sharma, Professor, UCMS Dr. R. P. Swaminathan, Dean-JIPMER Dr. P. Jambulingam, Chair, ICMR Dr. S. L. Hoti, Emeritus Scientist & Sr. Consultants, OIC, Field Stations, Kottayam, Koraput & Madurai and Scientists & Technical Officers
21	27.11.2020	All the ongoing, completed and new projects were reviewed by the expert members of Scientific Advisory Committee in a virtual meeting.	Dr. Ashwani Kumar, Director Prof. A. P. Dash, SAC Chairman & VC, AIPH Dr. Manju Rahi, Scientist-F Dr. Sarala K Subba Rao, Former Director, NIMR Dr. D. A. Gadkari, Former Director, NIV Dr. Priya Abraham, Director,NIV Dr. P.L. Joshi, Former Director, NVBDCP Dr. R. S. Sharma, Former Addl.Director, CME&VC Dr. Arun Sharma, Professor, UCMS Dr. R. P. Swaminathan, Dean-JIPMER Dr. P. Jambulingam, Chair, ICMR Dr. S. L. Hoti, Emeritus Scientist & Sr. Consultants, OIC, Field Stations, Kottayam, Koraput & Madurai and Scientists & Technical Officers
22	04.12.2020	India International Science Festival 2020 , Health research conclave curtain raiser was held virtually	Dr. Ashwani Kumar, Director Dr. Samiran Panda, Head, ECD Dr. Rajnikant, Director, RMRC, Gorakpur Dr. Rakesh Aggarwal, Director, JIPMER Dr. Rajpal Singh Yadav, Scientist, NTD, WHO; Dr. Nisha Mathew, Scientist-F
23	10.12.2020	ICMR-VCRC signed Memorandum of Understanding (MoU) with Bharathiar University for scientific exchange programme.	Dr. Ashwani Kumar, Director Dr. S. Poopathi, Scientist-G

24	17.02.2020	Director, Dr. Ashwani Kumar took over as Director-in-charge, ICMR-NARFBR, Hyderabad.	Dr. Ashwani Kumar, Director

Ownership and other issues of the Vector newsletter abide by the Rule 8 of the Newsletter Registration (Central) Rules, 1965.

Form IV

See Rule 8

Place of publication	:	ICMR-Vector Control Research Centre Indira Nagar, Medical complex, Puducherry – 605006
Periodicity of publication	:	Half yearly (June & December)
Name of the publisher & editor	:	Dr. Ashwani Kumar
Nationality	:	Indian
Address	:	ICMR-Vector Control Research Centre Indira Nagar, Medical complex, Puducherry – 605006
Name and address of the owner who own the newsletter owner holding more than one per cent of the total capital	:	ICMR-Vector Control Research Centre Indira Nagar, Medical complex, Puducherry – 605006
Email address	:	director.vcrc@icmr.gov.in
Website	:	www.vcrc.icmr.org.in

I, Dr. Ashwani Kumar, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date:

Ashwani Kumar
Signature of the Publisher