ANNUAL REPORT 2020-2021

ICMR- Regional Medical Research Centre, Gorakhpur

वार्षिक प्रतिवेदन

Annual Report
2020-2021

आई. सी. एम. आर.-क्षेत्रीय आयुर्विज्ञान अनुसंधान केन्द्र, गोरखपुर

ICMR- Regional Medical Research Centre, Gorakhpur

Gorakhpur, INDIA- 273013

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FROM DIRECTOR'S DESK...

It is may proud privilege and honor to present the Annual Report of the Institute for the year 2020-21. The year has been one of the most challenging and difficult year for the mankind when whole world was struggling with the pandemic of COVID-19. The Institute also rose on the occasion and immediately established the BSL-2 plus laboratory for COVID-19 testing facility and provided unprecedented support to the State Govt. Till date more than 3.75 lakhs tests have already been done by this laboratory. Besides testing the Centre was also involved in carrying out the sero-surveillance study for SARS-CoV2 in selected districts of eastern UP as part of the pan India study conducted by ICMR. We also worked on the clinico-epidemiological profile, psychosocial issues and impact of COVID-19 on MCH services in collaboration with other ICMR Institutes. The work on the diagnosis of JE/AES was continued and Scrub Typhus continued the remain the major etiology for the AES. Under the Health and Demographic Surveillance System the Cohort of around one lakhs population was continued to be monitored and base line information on major health parameters was collected from 28 villages. Facts sheets have now been prepared. The Institute also carried forward the work of National TB Prevalence Survey and till now have completed 14 clusters in eastern part of the UP. Hon'ble Chief Minister of UP, Shri Yogi Aditya Nath visited the Centre in July to inaugurate the BSL-2 facility, he also appreciated the ongoing work of TB Survey. Capacity building and inter-agency collaboration with BRD, Medical College, AIIMS, Gorakhpur and Gorakhpur University was further strengthened and a workshop on Biomedical ethics was conducted, where around 175 medical professionals, Scientists and students participated. Training was also provided to other personnel from adjoining Hospitals/Medical Colleges for COVID-19 diagnosis. The construction work of the new building of RMRC was further enhanced and is likely to be completed soon. During the year a total of 20 papers/book Chapters/articles were published in national and international journals.

I congratulate all the Scientists, Technical and Administrative manpower engaged for their hard work and wish everyone a big success in their future endeavors.

Dr. Rajni Kant
Director

ONGOING STUDIES 1

1.1 Coronavirus Disease - 19 (COVID-19) Studies

1.1.1 Molecular diagnosis of SARS-CoV-2 (nCoV-19) specimens obtained from Uttar Pradesh state health department

Principal Investigator: Dr R. Kant, Dr K. Zaman

Co-PIs & Investigators: Dr H. Deval, Dr G. R. Dwivedi, Dr A. K. Pandey, Dr R. Singh, Dr B. R. Misra, Dr S. P. Behera, Dr N. Kumar & Dr G. K. Yadav

Starting date: March 2020

Duration: Ongoing

Funding: ICMR, New Delhi

Objectives

- To provide diagnosis for suspected COVID-19 cases obtained from health department of Uttar Pradesh

Background

India has taken essential measures to control the spread of this virus and management of disease caused by nCoV-19 in the country. One of the key measures to manage the COVID-19 is widespread testing of this virus. Uttar Pradesh reported first laboratory confirmed case of nCoV-19 on 4 March 2020 from Ghaziabad district of Uttar Pradesh and first COVID-19 fatality from Basti district of eastern Uttar Pradesh region. Remarkable increase in testing capacity of nCoV-2 could be achieved due to timely expansion of screening capabilities across the country to test samples from suspected cases of COVID-19.

Work Done

A total of **318,500** clinical specimens of suspected cases of COVID-19 were tested through Q-RT-PCR method from 23rd March 2020 to 28th February 2021 by ICMR-RMRC, Gorakhpur team. Major bust in testing was observed in month of November-20 and December-20 since beginning of the laboratory diagnosis of SARS-CoV-2 virus at ICMR-RMRC, Gorakhpur as in figure 1.

Figure 1. Monthly laboratory testing and positive specimens of COVID-19 from 23rd March 2020 to 28th February 2021

Overall positivity for nCoV-2 infection was 1.6% during the testing period. Maximum positivity was observed in the month of May-20 and lowest positivity was observed in the month of February-21 as shown in figure 2.
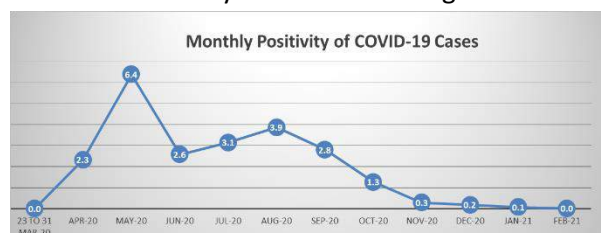

Figure 2. Monthly positivity of COVID-19 cases from 23rd March 2020 to 28th February 2021

Maximum specimens were obtained from Maharaganj district followed by Kushinagar, Sant Kabir Nagar, Siddharthnagar and Basti districts of eastern Uttar Pradesh.

1.1.2 Molecular surveillance and assessment of genomic diversity of SARS CoV-2 in Eastern Uttar Pradesh

Principal Investigator: Dr H. Deval

Co-PIs & Investigators: Dr R. Kant, Dr P Yadav Dr A. S. Aich, Dr D. Nyayanit, Dr K Zaman, Dr S. P. Behera, Dr P. Shankar, Dr R. Singh, Dr G. R. Dwivedi and Dr A. K. Pandey

Starting date: April 2020

Duration: One year

Funding: ICMR, New Delhi

Objectives

- To study the genomic diversity and evolution among the SARS-CoV-2 strains in Eastern Uttar Pradesh.
- To study the clinical presentations and basic epidemiological features of SARS- CoV-2 infection in the region.

Background

ICMR-RMRC Gorakhpur is one of the national reference diagnostic laboratory of ICMR for testing and confirmation of COVID-19 suspected cases through RT-PCR in eastern Uttar Pradesh region. The samples have been received from various districts namely Gorakhpur, Maharajganj, Deoria, Kushinagar, Basti, Sant Kabir Nagar and Siddharthnagar, Azamgarh, Mau, Balia and Ayodhya. The majority of the cases (95%) were asymptomatic as compared to the mild and severe. The study will be helpful in knowing the pattern of diversity among the different strains of SARS-CoV-2 and their clinical outcome (symptomatic, asymptomatic and severe). This study will fill the gaps regarding the genomic distribution of strains,

mutational analysis and the clinical variations among the individuals.

Work Done

Whole genome sequencing of approximately two hundred samples is being in process at NIV, Pune. Data analysis and phylogenetic characterization based on the initial data shows the sequences retrieved belong to four different GISAID clades namely G, GH, GR and S.

Future Plan

Complete analysis of data to understand the pattern of diversity among the different strains of SARS-CoV-2 and their clinical outcome.
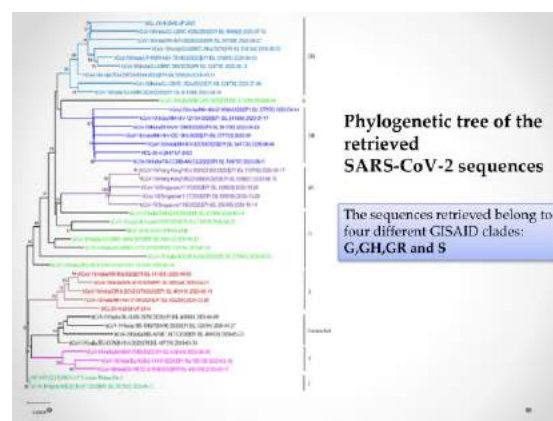

Fig. 1. Phylogenetic tree of SARS-CoV-2

1.1.3 Impact of COVID-19 on Maternal and Child health services in India

Principal Investigator: Dr G. R. Dwivedi

Co-PIs & Investigators: Dr R. Singh, Dr K Zaman, Dr B. R. Misra, Dr A. K. Pandey and Dr H. Deval

Starting date: November 2020

Duration: One year

Funding: ICMR, New Delhi

Objectives

- Assess trends of antenatal care visits, maternal and paediatric admissions, institutional deliveries, emergency obstetric care, abortion care, new born care and postnatal care at the health care facility level during COVID-19 epidemic.
- Assess trends of childhood immunization during the COVID-19 outbreak.
- Assess and understand the health seeking behaviour of women with respect to MCH services during the COVID-19 epidemic.
- Assess the challenges and response strategies of the health system delivering MCH services during the COVID-19 epidemic.

Background

The National health Policy of India emphasises on universal health coverage with specific targets for reduction of both maternal and infant mortality in India by the year 2025. The impact of COVID-19 on the maternal and child health services is yet to be ascertained in India, however experience from even developed countries have shown disruption of essential health services especially health services for the pregnant mothers and new born. The study aims to assess the impact of the ongoing COVID-19 epidemic on the Maternal and Child health service in India.Although outreach services for MCH care has been restricted, Government of India has taken measures to ensure that beneficiaries visit peripheral facilities on particular dates as informed to them telephonically or through ASHAs. It would be important to assess the likely impact of these measures on the demand and uptake of MCH services amidst the fear and panic induced by COVID-19 and further guide policymakers to address the gaps.

Work Done

The immediate impact assessment was done via two-pronged strategy.

a. Rapid assessment survey with structured tools (questionnaires) through telephonic interviews/web-based surveys of both the Health care workers and MCH beneficiaries.

b. Analysing the data available through Health Management Information System (HMIS) and SNCU online database.

Table.1 Health care workers and MCH beneficiaries involved in the rapid assessment survey

Consent/ Questionnaire completed				
S. No	District official /CHC official/PHC official / Beneficiaries	Kushinagar	Sant Kabir Nagar	Raebareli
1	District Immunization Officer	Yes	Yes	Yes
2	District Program Manager	Yes	Yes	Yes
3	District Monitoring and Evaluation Officer (NHM)	Yes	Yes	Yes
4	Gynaecologist	Yes	Yes	Yes
5	Paediatrician (SNU)	Yes	Yes	Yes

6	Staff Nurse	Yes	Yes	Yes
7	MOIC/SMO	Yes	Yes	Yes
8	ANM (03)	Yes	Yes	Yes
9	ASHA (03)	Yes	Yes	Yes
10	Beneficiaries (30)	Yes	Yes	Yes

All the questionnaires for the officials, ASHA/ANM and MCH beneficiaries were filled and entered into the CSPro from studied districts as required.

Future Plan

Final analysis of rapid assessment survey and data available on Health Management Information System is under processing.

1.1.3 A qualitative study on psycho-social issues and challenges of individuals diagnosed with Covid-19 in eastern Uttar Pradesh

Principal Investigator: Dr G. K. Yadav
Co-PIs & Investigators: Dr K. Zaman, Dr P. Shankar
Starting date: May 2020
Duration: Six Months
Funding: RMRC, Gorakhpur

Objectives

- To understand the psycho-social issues faced by Covid-19 positive cases (non-migrants) before and after the discharging from hospital.
- To understand the psycho-social issues faced by Covid-19 positive migrant cases before and after the discharging from hospital.
- To develop the intervention strategies and suggestions to the concerned authority to deal with and overcome the psycho-social issues and challenges of Covid-19 positive cases.

Background

The COVID-19 pandemic has psychologically impacted the one and all; the people have become like imprisoned in one place. On one hand, people are facing many kinds of everyday need related problems, economic problems and lacks of minimum essentials for living, the sick people suffering from other diseases have to face the scarcity of medical assistance and medicines. On the other hand, the individual experiences mentally troubled due to feeling of uncertain life of his hew own or their loved one. The threat of getting infected with the Covid-19 deadly virus is threatening around the clock, in the event of such a state of mind that what will be the fate of next moment, away from loved one living in the distant places for long time of lockdown, worried about each other's health become people emotionally tortured.

In such a situation, it is necessary to understand the psycho-social issues of individuals with covid positive in different stages to which they are going through, so that the appropriate remedial steps can be taken to overcome the psycho-social issues of Covid positive case.

Work Done

This study was conducted to examine psycho-social issues and challenges of people diagnosed with Covid-19. A total number of 58 Covid-19 recovered in which 29 non-migrant and 29 migrant covid-19 recovered individuals have been enrolled from Gorakhpur, Basti, Sant Kabir Nagar, Siddharth Nagar and Maharajganj districts from northern Uttar Pradesh. A face-to-face and telephonic interview based on semi structured open-ended questions pertaining to seeking of experiences before and after

discharge from hospital has been conducted over the covid-19 recovered non-migrant and migrant individuals respectively. The content analysis of thematic responses of participants has been used to analyse the qualitative data. The data showed that most of individuals faced a lot of psycho-social issues during and after quarantine and isolation period. However, some of them not felt such kind of experience due to their relatives and family members also were there with them during quarantine and isolation period. Migrant workers were found with higher problems than the non-migrants. The experiences during different phases of being suspected, quarantine, confirmed with covid-19 infection hospitalization, as well as at the time of journey have also been reported in this study.

Future Plan

Final analysis and interpretation of qualitative data is under progress.

1.1.4 Factors Related to Covid-19 Stigma: A Mixed Method Study

Principal Investigator: Dr G. K. Yadav
Co-PIs & Investigators: Dr A. K. Pandey, Dr K. Zaman, Dr R. Singh, Dr B. R. Misra, Dr S. P. Behera, Dr N. Kumar
Starting date: November 2020
Duration: Six Months
Funding: ICMR, New Delhi

Objectives

- To study the community's understanding of the cause, spread and prevention related to COVID-19
- To understand the perception of self and others at risk among the communities

- To identify the measures taken by the communities to protect themselves from the COVID-19
- To explore the perceptions and experience of COVID-19 stigma in the communities
- To understand the experiences of COVID -19 infected individuals (after discharge)
- To elucidate the measures to mitigate the COVID-19 stigma

Background

Stigma and discrimination can occur when people associate a disease, such as COVID-19, with a target population or nationality, even though not everyone in that population or from that region is specifically at risk for the disease. For example, anyone who has had a travel history, those who have travelled from certain countries such as China, South Korea or currently Italy or Spain is looked upon more suspiciously than others. This coupled with the quarantine order on the one hand and being branded as suspects endorsed with a sticker on their doors, on the other hand, seem to people at risk of stigma and discrimination during and post quarantine period.

this study is proposed to provide insight into the stigma associated with the present infectious diseases (COVID-19) and the potential consequences of such stigmatization. These study findings would pave the way for developing need-based interventions measures to mitigate COVID-19 stigma as perceived and experienced by the communities in India.

Work Done

Prepared a list of all the people (age range 18-99 years) with the help of updated voter lists acquired from both districts–Gorakhpur (N=34,86,821, random number=31,989) & Basti (N=18,12,434, random number=16,627) for sample selection from community. The list of Covid-19 discharge cases also been acquired from both districts CMO offices for selection of Covid-19 recovered cases.

Completed the selection of samples from community (n=109) using systematic random sampling from both districts in equal ratio of gender & rural-urban population. However, a simple random sampling technique has been used for selection of total 16 Covid-19 discharge cases from each district. Hence, the total number of samples for the study was selected as 250 samples from both the districts (Gorakhpur, n=125) & (Basti, n=125). The detail of number of selected samples in each category and study method is mentioned in the following table:

For Quantitative Study:

Gorakhpur District n=125 Urban-81.17% Rural-18.83%	Community (n=109) Systematic random sampling N=34,86,821, Random No. 31989				Recovered (16) Random sampling			
	Rural (89)		Urban (20)		Rural (13)		Urban (03)	
	Male	Female	Male	Female	Male	Female	Male	Female
	45	44	10	10	07	06	01	02

Basti District n=125 Urban-81.17% Rural-18.83%	Community (109) Systematic random sampling N=18,12,434, Random No. 16627				Recovered (16) Random selection			
	Rural (102)		Urban (07)		Rural (09)		Urban (07)	
	Male	Female	Male	Female	Male	Female	Male	Female
	51	51	04	03	05	04	03	04

For Qualitative Study: Random selection taken from main list of selected / studied samples (125)

Gorakhpur District n=12	Community (06) Random selection				Recovered (06) Random selection			
	Rural (06)		Urban (00)		Rural (05)		Urban (01)	
	Male	Female	Male	Female	Male	Female	Male	Female
	03	03	00	00	03	02	01	00

Basti District n=12	Community (06) Random selection				Recovered (06) Random selection			
	Rural (06)		Urban (00)		Rural (05)		Urban (01)	
	Male	Female	Male	Female	Male	Female	Male	Female
	03	03	00	00	02	03	01	00

Quantitative as well as qualitative study has been conducted on above mentioned subjects. Collection and entry of data and analysis has been completed and submitted to national PI of the project. Interpretation of findings report writing is under the process.

1.2 Japanese Encephalitis (JE) & Acute encephalitis syndrome (AES) studies

1.2.1 Diagnostic services for suspected Japanese encephalitis (JE) cases from eastern Uttar Pradesh

Principal Investigator: Dr R. Kant, Dr R. Singh
Co-PIs & Investigator: Dr K. Zaman, Dr N. Kumar, Dr G. R. Dwivedi, Dr H. Deval, Mr. K. Shaw, Mr. A. Kavthekar, Dr A. Mehta, Dr M. Mittal
Starting date: 2008
Duration: Ongoing

Funding: RMRC, Gorakhpur

Objectives

- To provide a diagnosisfor suspected Japanese encephalitis (JE) and AES cases admitted to BRDMC, Gorakhpur

Background

Since the last three decades, seasonal massive outbreak of acute encephalitis syndrome (AES) in the pediatric population with high case fatality has been occurring in the Gorakhpur division of Eastern Uttar Pradesh. Japanese encephalitis virus (JEV) identified as a causal agent in <10% of AES cases. However, recently *Orientia tsutsugamushi* (OTs) has been identified as an etiological agent in about 40-50% of AES cases (ST-AES). AES cases get admitted to BRD Medical College (BRDMC) for treatment as it is the only tertiary care unit in this region. ICMR-RMRC, Gorakhpur has been actively supporting BRDMC in diagnostic investigation of the clinically suspected acute encephalitis syndrome (AES) cases and provides the diagnosis for JEV and scrub typhus. In addition, we also rule out the antigenic cross-reactivity between JE and Dengue (DEN) as per the ICMR's recommendation. The findings are communicated within 24-36 hrs to BRDMC and concerned State/Central Health authorities.

Work Done

ICMR-RMRC Gorakhpur, undertake the routine investigation of clinically suspected Acute Encephalitis Syndrome (AES) cases admitted to the BRD Medical College

(BRDMC), Gorakhpur and provides diagnostic services that guide the management of cases. All the AES cases hospitalized from 1st January 2020 to 31st December 2020 were investigated for detection of anti-*Japanese encephalitis (JE) virus* specific IgM (anti-JE IgM), anti- *Orientia tsutsugamushi* IgM (anti -OTs IgM), Dengue NS-1 antigen (DEN NS-1 Ag) and Anti-*Leptospira* IgM Antibody (Anti-Leptospira IgM) by ELISA assays, and for Malaria diagnosis rapid diagnostic tests *(*RDTs) was used as per the ICMR recommendations.
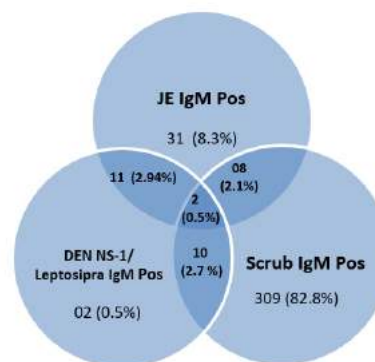
Fig.1 The percentage of etiologies documented in AES cases

A total of 1019 clinical specimens (CSF and Serum) were collected from 565 AES cases. Seventy seven percent of the AES cases admitted to the BRD Medical College were found to be reactive to one or more aetiologies (Fig-1). Anti-JE IgM, anti-OTs IgM and DEN NS-1 Ag positivity were documented in 52 (10.3%), 329 (58.7%) and 13 (2.5%) AES cases respectively. In 8 AES cases, neither serum nor CSF was available for testing (Table 1).

Table 1: Specimens tested with anti-JE IgM, anti-OTs IgM and Dengue NS-1 Ag ELISA

(No. of cases) 2020	Specimens Type	Total samples received and tested	Anti-JE IgM Positivity (%)	Anti-OTs IgM Positivity (%)	DEN NS-1 Ag Positivity (%)	Anti-Lepto IgM Positivity (%)
AES (565)	CSF	514	15 (2.9%)	244 (47.5%)	--	--
	SERUM	505	51 (10%)	269 (53.26%)	13 (2.6%)	13 (2.6%)

1.2.2 Development of diagnostic kit for rapid and early detection of *Orientia tsutsugamushi* based on isothermal recombinase polymerase amplification and lateral flow analysis

Principal Investigator: Dr R. Singh

Co-PIs & Investigators: Dr S. Kulkarni, Dr R. Kumar, Dr K. Zaman, Dr H. Deval

Starting date: February 2020

Duration: Two Years

Funding: ICMR, New Delhi

Objectives

- To develop and validate the nucleic acid based RDT kit to detect *Orientia tsutsugamushi*

Background

Scrub typhus (ST) [*Orientia tsutsugamushi* (OT) infection] identified as major cause of acute encephalitis syndrome (AES) and acute febrile illness (AFI) in various part of India. There are no rapid diagnostic tools available for ST. Therefore, most of the cases of ST remain undiagnosed in these areas. This results in severe complications like multi organ failure or acute encephalitis syndrome (AES) with high fatality. This is the need of hour to develop a sensitive and specific rapid diagnostic kit (RDT) for detection of OT infection in the early stages especially in the remote area where infrastructure and instrumentation facilities are unavailable.

Recently, nucleic acid based RDT kit has been developed to detect *O. tsutsugamushi* (Karp) strain endemic in China. However, Gilliam, Kato, Karp etc. are the major stains of OT prevalent in India. Thus, in the present study, we are developing a nucleic acid based RDT kit which can detect OT strains prevalent in India.

Work Done

The type specific antigen 56kDa gene has been identified for the development of kit based on isothermal polymerase gene amplification and read out on lateral flow analysis. The 56-kDa full gene was cloned from Standard strains of OT including Gilliam, Karp, Kato and Kostival obtained from CDC. Further, the primers and probe for RPA were designed manually, according to the twistdx assay design manual. The three forward primers, two reverse primers, and two probes were initially designed for optimization. The reverse primers used for RPA were labelled with biotin at 5' end. The probe was labelled with carboxyfluorescein (FAM) at 5' end and the 3' end was blocked with a phosphate group and an abasic site (THF) is introduced between the 30th and 31st base position. The abasic site in the sequence is recognized by the nfo endonuclease (IV) and cleaved leaving the 3' ends free for further extension. The nucleotide code degeneracy was added accordingly.

To optimize the RPA assay, various concentrations of forward/ reverse primer (200-420nM) and probe (60-120nM) were used to conduct the RPA–LF method. At the preliminary stage, we successfully optimized the diagnostic method for visual detection of *Orientia tsutsugamushi* prevalent strains, Gilliam and Karp, in India within an hour (including DNA extraction). Further, the developed strategy did not require specialized instruments like thermal cycler (PCR machine) (Figure-1).

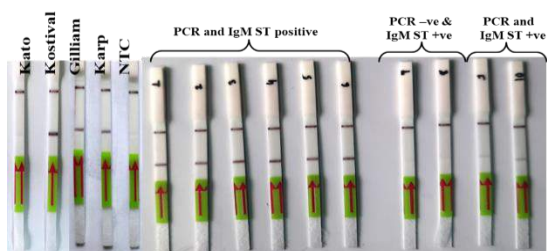Figure1: RPA-LFA assay**(A)** End-point detection using different standard strains of *O. tsutsugamushi*. **(B)** RPA-LFA with clinical ST positive samples.

1.2.3 A study of psycho-neurotic disorders and socio-behavioral changes among AES/JE cases recovered in Gorakhpur

Principal Investigator: Dr. G. Yadav
Starting date: February 2020
Duration: Two Years
Funding: ICMR-RMRC, GKP

Objectives

- To examine the level of psycho-neurotic disorders among AES/JE recovered cases in Gorakhpur.

- To understand the socio-behavioral changes among AES/JE recovered cases in Gorakhpur.

- To examine the level of psycho-neurotic disorders & behavioral changes as function of time duration elapsed after recovering from AES/JE.

Background

Various studies confirmed the occurrence of changes in brain due to AES/JE. And neuropsychiatric sequelae with cognitive and language impairment. And, psycho–neurotic disorders & behavioral asymmetries are associated with brain mechanism & its biological characteristics. Therefore, it is rational to investigate whether there is functional relation of AES/JE with psycho–neurotic disorders & behavioral changes.

Available literature suggests that the study on relationship between AES/JE & psycho-neurotic disorder; & with socio-behavior aspects have not been carried out among AES/JE recovered cases in Gorakhpur. It's rational to believe that AES/JE recovered cases are more likely to develop more psycho-neurotic sequelae & socio-behavioral deviations due to changing in brain and neural mechanism.

Work Done

All the prior formalities and procedures have been completed which is needed before the conduction of study. The procedure of sample selection has been framed. Data collection tools and questionnaires along with consent letter and participants information sheet have been designed. The project has already been submitted to the IHEC.

Future Plan

The field study will be started after getting clearance from the IHEC. The study is planned to conduct on total 300 (30 × 10) AES / JE recovered cases from Gorakhpur district. Ten group of JE / AES recovered individuals across the different time durations elapsed after the recovery from disease will be enrolled to conduct the study.

1.3 Other important studies

1.3.1 Establishment of a Health and Demographic Surveillance System [HDSS], Gorakhpur, Uttar Pradesh

Principal Investigator: Dr. K. Zaman

Co-PIs & Investigators: Dr A. R. Deoshatwar, Dr. M Murekhar, Dr N. Gupta, R. Yadav, K. Kumar, Dr. P. Shankar, P. Yadav

Starting date: 2018
Duration: Three Years
Funding: ICMR, New Delhi

Objectives

- Establish a "Demographic and Epidemiologic Surveillance System" coupled with GIS mapping of the HDSS area in Gorakhpur, Uttar Pradesh.
- Identify patterns and trends of morbidity and mortality in the HDSS population.
- Generate data on risk and protective factors of diseases prevalent in HDSS area.
- Monitor socio-economic status of the HDSS population.
- Monitor nutritional status of HDSS population, especially pediatric groups.
- Identify health priorities and hygiene issues, water and sanitation issues.
- Formulate a base for establishment of population linked biorepository [Phase-3]

Background

The establishment of HDSS will be done in two phases. The first phase (12 months) will include the recruitment and orientation training of core-team and field staff at other well established HDSS's in India. The core team, after analysing their observations of other HDSS's, will decide on the data management system that will be appropriate for meeting the objectives of Gorakhpur HDSS. The system will be chosen with a futuristic view so that studies to be performed are easily linked with / incorporated on the same platform. Collaboration with Gorakhpur district administration including SDM, CMO Gorakhpur and Anganwadi project officers/ BDOs [Block Development Officers], and Gram Pradhans will be done for permission and approval of study at village levels. Following that the study area will be identified and marked into clusters. Data of household and individual level information will be initiated taking into account the demographic, socio-economic details and additional survey round will include information about events like birth, death, migration, and etc. In the second phase, after the baseline survey round where all households and members of the HDSS are registered, all subsequent rounds will be concerned with updating events in this population.

Work Done

Baseline demographic data of HDSS area and Health Data from IDSP: It's essential to have prior information about the population which is going to be surveyed. In this regard we have collected information from Census, local authorities like Gram Pradhans and village secretary. We have collected the basic socio-demographic data like population, geographical area, sex ratio, child sex ratio, total literacy rate, male literacy rate, female literacy rate, the percentage of SC/ST population and working population from census data and local authorities about 28 villages included in HDSS Gorakhpur site area. To know the disease profile of the HDSS site villages, we have collected health morbidity

data from district hospital through IDSP network about the disease profile of OPD patients. This data will also help us in designing our morbidity schedule which will be covered in the next follow-up rounds of the survey.

Designing data collection tools and piloting: To form the basic household survey schedule, we first thoroughly study the existing survey schedules of In-Depth network, HDSS Vadu, NIE Chennai Ayapakkam Cohort and National Sample Survey Organisation (NSSO_ Round 71) and National Family Health Survey (NFHS) report. The questions were extracted from these questionnaires according to the objectives of our base line survey requirements. The questionnaire was prepared in two languages English and Hindi. After preparing the questionnaire we performed paper-based pilot survey on 23 households (123 individuals) in one of the 28 villages, to check the appropriateness of the questions to the target population and to modify the options provided in each question according to the target population. The data management system at NIE Chennai was reviewed. It was decided the IT team of NIE would support us in creating ODK based data collection tools and managing the data on their server till GKP site get its IT section well established. After completing the pilot survey, the questionnaire was modified and discussed with other scientific and technical personnel of the institute and their suggestions were incorporated. After more modifications in our tool, we performed one more CAPI-based on ODK pilot survey on 85 households (378 individuals) in one of the 28 villages in August 2019.

Training of the Core Team and HDSS Staff: Core team attended training on HDSS system at NIE Chennai, RMRC Dibrugarh and HDSS Vadu. Two days training program was organised for HDSS Staff on Field activities staff, Social aspects of Community, Survey, and Handling on GPS, First Aid etc. on 26th and 27th September 2019 in ICMR RMRC GKP.

Mapping & Listing: Mapping and listing of every household in all 28 villages have been completed. A total of 27064 households have been listed. GPS mapping of 21 villages completed.At district level, from health department Chief Medical Officer (CMO) and Additional Director (AD) Health, Gorakhpur has been involved and from Gorakhpur Administrative Department District Magistrate (DM), Additional District Magistrate, Superintendent of Police (SP), Police Adhikshak (rural) Police Adhikshak (urban) and Thanadhyakshya are involved.

At local Gram Pradhan of each village, Deputy Medical Officer and at local level Medical Officer-in-charge of the PHC, ANM and ASHA have been involved. Experts from other HDSS sites: Dr. Sanjay Juvekar (HDSS Vadu), Dr Manoj Murekhar & Dr Tarun Bhatnagar (NIE Chennai) has been involved.

Work done from Nov- 2019 to Mar-2020

Formation of Community Advisory Board: For the purpose of smooth and correct data collection and to enhance the community participation, Community Advisory Board was formed which consists of 148 members from the community (3 to 5 members from each village according to size of the village). Apart from them, CMO Gorakhpur, MOICs of block PHCs, Community Development Block officials, Director ICMR RMRC Gorakhpur and

PI of HDSS project are members. First meeting of CAB was held on 20th November 2019

before starting of data collection.
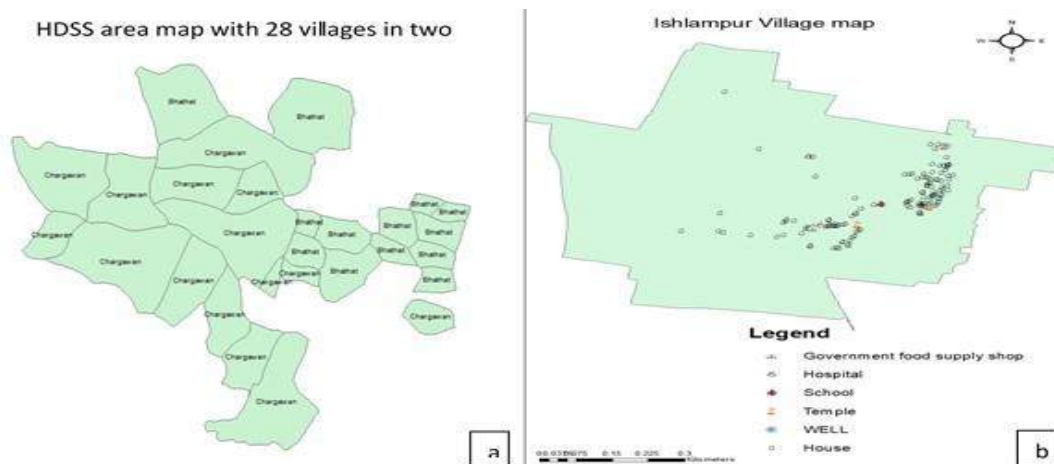
Figure 1: GPS based map of the 28 villages and detailed map of a HDSS village

Table 1: Dashboard of the daily update on data collection (till 2nd Dec 2020)

Cumulative Status of Enrolment & follow up		
Sr. No.	**Information**	
1	**On-going Villages**	**7**
2	**No of HH Covered**	**13318**
3	**No of HH Members Covered**	**70844**
4	**No of HH Completed**	**12659**
5	**No of New HH added**	**462**
6	**No. of Villages completed**	**14**

Baseline Health and Demographic data collection:

Data collection: The team initiated the data collection from November 26, 2019. Seven teams, each with one supervisor and 3 field assistants were formed and data collection was started in 7 villages. A committee consisting of Gram Pradhan, ASHA, ANM and other key holders was approached before

starting data collection. Till 2nd Dec 2020, data collection has been completed in 11 villages and details of the households and members covered are described in table below.

Future plans

We will re-start our data collection phase from mid-November 2020. We are expecting to complete baseline data collection by March

2021 and soon after that second round will start.

1.3.2 National Survey for State Wise Prevalence of Microbiologically Confirmed Pulmonary Tuberculosis in India

Principal Investigator: Dr. G. R. Dwivedi
Co-PIs & Investigators: Dr. K. Zaman, Dr. A. K. Pandey
Starting date: 2019
Duration: 2021
Funding: ICMR, New Delhi

Objectives

Primary objectives

- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥15 years in age in India at national level.

- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥15 years in age for 20 individual states / state groups.

Secondary objectives

- To explore health seeking behaviour of survey participants who are:
  Symptomatic and
  Asymptomatic

- To estimate the prevalence of TB infection among the surveyed

- To find out the source of treatment, [whether RNTCP or non-RNTCP] among persons having history of ATT (previous / current) in last one year.

- To determine the proportion of those currently on TB treatment who were notified to the RNTCP surveillance system

- To estimate the expenditure incurred by survey participants who are currently on TB treatment

- To profile socio-demographic and associated risk factors or TB Disease including diabetes, nutrition, anaemia and smoking.

- and it will also help provide better health care in India.
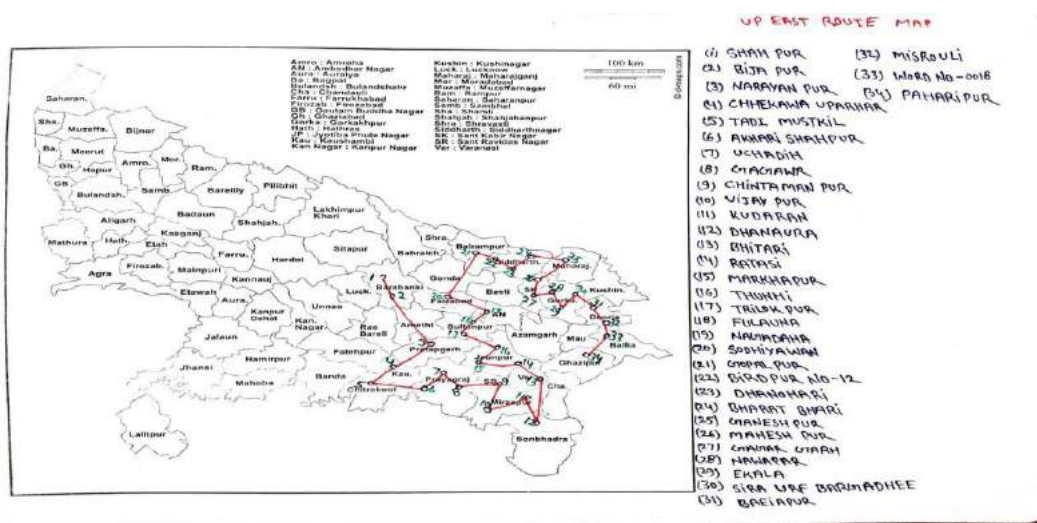
Figure 1: Survey rout map for ICMR-RMRC, Gorakhpur team

ONGOING STUDIES 1

Background

This survey is being started across all over India (20 state/state groups) conducted by NIRT Chennai. TB nationwide survey was never repeated after 1956. And this makes it all the important to conduct a nationwide TB prevalence survey if we really want to closely monitor the progress towards TB control with the aim to "End TB" as per sustainable development goal (SDG). It is important to know the disease burden at national level, considering the diversity and variation of burden of diseases across the country.

Purpose of the survey study

A total of 5 lac individuals from throughout the country will be participating in this survey during a period of 1 year. By participating in the survey, they will help provide us with information that can be used to improve the tuberculosis prevention and control program

Honourable Chief Minister Uttar Pradesh government, Yogi Adityanath inspecting mobile laboratory unit of TB prevalence survey in presence of the director Dr Rajni Kant, ICMR-RMRC, Gorakhpur and TB prevalence survey team

Work Done A total of 34 clusters in 21 districts of eastern Uttar Pradesh is assigned confirmed cases of pulmonary tuberculosis as shown in figure 1. Fourteen clusters have been completed till 10 March 2021. More than fifteen thousand individuals were covered during the survey from completed clusters. More than ten thousand X-ray examinations were conducted by this team. Apart from this approximately twelve to ICMR-RMRC team for the prevalence study of microbiologically hundred CBNAAT diagnosis was also performed to confirm pulmonary tuberculosis and drug resistance in confirmed cases of pulmonary TB. A total of thirty three individuals were found positive, out of these twenty three were ripamfacin susceptible, four were ripamfacin resistant and six were ripamfacin intermediate.

Future Plan

Prevalence survey will be performed from remaining twenty clusters of eastern Uttar Pradesh.

1.3.3 Assessment of lymphatic filariasis transmission after post mass drug administration in Gorakhpur district

Principal Investigator: B. R. Misra
Starting date: 2019
Duration: One and half year
Funding: RMRC, Gorakhpur

Objectives

- To evaluate microfilaria transmission cycle in rural and urban areas of Gorakhpur
- To assess impact of Mass drug administration program in endemic area of eastern Uttar Pradesh
- To evaluate susceptibility of synthetic insecticides in filariasis vectors of Gorakhpur district

Background

Filariasis is a neglected tropical disease caused by the infection of filarial worm *Wuchereria bancrofti* and *Brugia malayi* transmitted from human to human by mosquito biting.

The government of India is signatory for the elimination of filariasis from India in 2020. All the districts have completed more than 5 rounds of Mass Drug Administration by the end of 2014, and are required to be evaluated to decide whether to stop or continue MDA program.

A post MDA filariasis parasite screening in mosquito vectors is necessary for the verification of interruption of transmission cycle of filariasis parasite in endemic area. A post MDA filariasis parasite screening in mosquito vectors is necessary for the verification of interruption of transmission cycle of filariasis parasite in endemic area.

WHO recommends use of vector control measures where filariasis is co-endemic with malaria and dengue.

Work Done

- Finalization of study villages from 19 administrative blocks of this district was completed.
- *Culex quinquefasciatus* mosquito collection was completed from three administrative blocks of Gorakhpur District.

Collection of Adult *Cx. quinquefasciatus* female mosquitoes from **24** (6 villages x 4 households**) rural houses** and **4 urban houses.**

Table: Relative abundance of *Cx. quinquefaciatus* female mosquito and number of pools prepared

Admn. Block	Chargawan	Jungle Kaudia	Bharohiya
Relative abundance	0.6	0.2	0.2
No. of Mosquito Pools	13	3	5

Future Plan

Collection of mosquito specimens from the remaining rural and urban sites of Gorakhpur and screening of female *Cx. quinquefaciatus* mosquitoes for lymphatic filariasis parasite.

1.4 Keylong Field Station Activity

Keylong field station was incepted in June 2015 and located at 10,100 feet above mean sea level (MSL) after the recommendations of XII plan proposals and high-power Committee recommendations towards expanding ICMR outreach activities in un-served and difficult remote inaccessible areas. Government of Himachal Pradesh has transferred the government land at Guskiyar village at Lahaul and Spiti district (H.P) for establishment of this Field Station. Since its inception, this field station was operated under

Research Activities

ICMR-NIRTH, Jabalpur to conduct biomedical and social science research on health issues of this region. On 30th November 2020 Keylong field station functioning under the direction of the Dr. Rajni Kant, Director, ICMR-RMRC Gorakhpur. The main objective of this field station is to ascertain the major social, cultural and environmental determinates of health that drive ill-health and the seasonal variations in health problems of the high-altitude region.

S.No.	Research Activities	Year	Study area	Status
1	Sickle cell anemia	2016-2018	Lahaul & Spiti	Completed
2	Hepatitis B & C	2016-2018		Completed
3	Reproductive Tract Infection (RTI) Prevalence	2017-2018		Completed
4	Study on Reproductive Tract Infection (RTI) among women in Lahaul & Spiti district	2018-2020		Ongoing
5	CHNA (Community Health Need Assessment)	2019-2020		Not Completed
6	Tuberculosis (TB) study			
7	CHA (Community Health Assessment)			

Research Publication

- Sharma RK, Shukla MK, Minhas N, Barde PV. Seroprevalence and risk factors of hepatitis B virus infection in tribal population of Himalayan district Lahaul and Spiti, India. Pathogen & Global Health. 2019;113(6):263-7.

- Minhas N, Shukla M, Sharma DD, Subramaniam RS. Sickle cell anaemia and G6PD deficiency in Lahaul & Spiti district of Himachal Pradesh. Indian J Med Res 2019 (accepted)

COMPLETED STUDIES 2

2.1 Genetics of susceptibility to encephalitis in Japanese encephalitis virus-infected children from Uttar Pradesh.

Principal Investigator: Dr H. Deval
Co-PIs & Investigators: Dr K. Alagarasu, Dr M. Mittal
Starting date: 2017
Completion date: 2020
Funding: (Extramural) ICMR

Objectives as approved

To find out whether single nucleotide polymorphisms in genes coding for:

- pattern recognition receptors (TLR3, TLR7, TLR8, DDX58 (RIG-1), IFIH1 (MDA-5), CD209, OAS, PKR and MxA) .
- inflammatory mediators and receptors (TNF, IFNG, IL1B, IL6, IL8, IL10, IL17, IL18, CCL2, CCR5, HMGB1) and c. matrix metallo proteinases (MMP2 and MMP9) are associated with acute encephalitis syndrome due to Japanese encephalitis virus in children from Uttar Pradesh.

Background

Acute encephalitis syndrome (AES) is a complex neurological syndrome resulting from the inflammation of the brain and is commonly reported in children. About 10% of AES cases in Uttar Pradesh are due to Japanese encephalitis virus (JEV) infection. The asymptomatic to symptomatic disease ratio for JE has reported to be in the range of 25-1000/1. About 70% of the symptomatic infections manifest as encephalitis and 30% of the symptomatic infections are fatal. The clinical outcome of the disease is influenced by factors involving host, virus and environment. There are only few reports on the role of host genetic factors in the development of encephalitis in JEV infected children. Polymorphisms in the genes coding for various molecules involved in the immune response against JEV might affect their expression and functioning and may be associated with susceptibility to encephalitis in JEV infection. Present work was carried out to study single nucleotide polymorphisms in genes coding for pattern recognition receptors, inflammatory mediators and receptors and matrix metalloproteinase and its association with AES caused by JEV in children from UP.

Results and conclusion

TNFA rs1800629 G/A genotype [OR with 95% CI1.91 (1.07-3.39)] and *IFNG* rs2430561 A/T genotype [OR with 95% CI 1.57 (1.11-2.21)] were associated with susceptibility to JE disease. CCR5 rs1799987 A allele was associated with JE in log-additive mode [(Odds ratio with 95% CI 1.38 (1.01-1.87)].

Analysis of genotype frequencies of *CD209* gene which codes for Dendritic Cell-Specific Intercellular adhesion molecule-3-Grabbing Non-integrin (DC-SIGN), a receptor for flaviviruses including JE virus revealed that *CD209* -336 A/G genotype was significantly associated with JE disease in an over dominant mode (A/G vs. A/A+G/G) [Odds ratio with 95% CI 1.55 (1.08-2.23)]. The G/G genotype of *CD209* -336 polymorphism was with resistance to JE disease in recessive mode [Odds ratio with 95% CI 0.35 (0.13-0.95)].

Analysis of Q279R SNP in the *MMP9* gene which codes for matrix metalloproteinase revealed that the heterozygous genotype G/A was associated with JE disease [Odds ratio with 95% CI 1.50 (1.07-2.11)].

2.2 Setting up of AES Cell at Baba Raghav Das Medical College, Gorakhpur

Co-PIs & Investigators: Dr M Mittal, Dr V. P. Bondre, Dr H Deval, Dr M. Murhekar, Dr K Zaman and others

Starting date: 2016
Completion date: 2020
Funding: (Extramural) ICMR

Objective Approved as

- To establish a centralized procedure for collection and storage of clinical specimens from AES cases reporting to the BRDMC
- To establish a dedicated laboratory for biochemical, pathological parameters and for diagnostic tests for suspected etiologic agents
- To establish a Data Centre within the AES Cell for electronic storage of clinical, demographic, epidemiologic and laboratory data

Background

'AES cell' was established on recommendations of ICMR to streamline the process of clinical specimen collection, distribution for different investigations and storage for future research on AES cases. Genetic characterization of ST and rickettsia was carried out to define the prevalence and circulation of different strains and to define their genetic relationship. AES cell was established. The present study creating an 'AES Cell' in BRDMC where most activities would be centralized and logistically disciplined approaches would be in place for day-to-day work. Most of the tests would be done in or within the ambit of AES Cell avoiding delays and repetitive tests. This would also result in saving the precious specimens (especially CSF from children) and streamline centralized record-keeping and testing. Ultimately, patients will benefit and a well-designed coordinated approach for diagnosis and treatment of AES patients would be established.

Results and conclusion

During the study duration 3679 AES cases were enrolled. 1619 patients tested positive for OT IgM (including samples from either CSF/ Serum) and 498 were positive for IgM JE. Results for scrub typhus PCR: 999/1736 (57.54%) where subtype seen were Gillium (90%) and Karp (10%). The rickettsia specific generic PCR amplified specific fragment in 26 specimens (whole blood) out of 229 total tested (11.3%).

The sub sets of clinical samples were further tested for various suspected aetiologies according to the clinical features by various serological kits by using serum specimens for; Malaria 2/295 (0.67%), Typhoid 3/293 (1.02%), Leptospira 11/455(2.41%), Measles 13/17 (76.4%), Mumps 12/17 (70.5%), HSV 1 & 2 (serum: 7/23 (30.4%), CSF : 3/7 (42.8%) , Rickettsia 4/31 (12.9%) and Hepatitis E 1/40 (2.5%) infections.

Clinically patients who were scrub positive presented with longer duration fever(>7days) in (43%) and when compared with patients who were scrub negative -abdominal pain (18.65% vs 10.76%), hepatomegaly (28.48% vs 17.49%), splenomegaly (4.26% vs 1.17%), thrombocytopenia($\leq$1,00,000/cumm) and deranged liver enzymes (ALT $\geq$30 IU/dl, AST $\geq$ 30 IU/dl) was found to be more common among scrub positive patients. Non scrub

patients had shorter duration fever (<3 days), and, altered sensorium (90.58% vs 85.37%) with a poorer GCS and seizures (86.54% vs 80.54%) more commonly. Eschar was found in only 5 scrub positive patients and maculopapular rash was noted among 5.62% patients. Mortality among scrub positive was lower (11.92%) as compared to patients who were scrub negative (26.32%). Scrub typhus remained the major etiological agent (44%). JE is still an important etiology (13.76%). In a large group of patients (32.31%) with a significant mortality the etiology still remained unidentified.

2.3 Clinico-Epidemiological Dimensions of COVID-19 during Infection & Post-Discharge: A Case Series in and around Gorakhpur in Eastern Uttar Pradesh

Principal Investigator: Dr R. Kant & Dr K. Zaman

Co-PIs & Investigators: Dr H. Deval, Dr G. R. Dwivedi, Dr R. Singh, Dr P. Shankar, Dr G. K. Yadav

Starting date: May 2020
Completion date: August 2020
Funding: Intramural

Objective Approved as

- To understand the clinico-epidemiological dimensions of COVID-19.
- To assess the spatial distribution of COVID-19 infection in the study area.

Background

Starting in December 2019 in Wuhan city of china COVID-19 has spread rapidly to other countries and cases are continuously increasing across the globe. At present (23rd may 2020) with more than 5 million cases and more than 3 lakh deaths the whole world is struggling to reduce, contain and prevent deaths from COVID-19. In India there are more than 1 lakh confirmed cases and more than 3.5 thousand deaths at present due to this infection.

Every country is fighting the pandemic in its own way. In India country wide lockdown is in effect for 60 days now in phases with 4th phase in effect at present. With limited health care resources, large and diverse population and with no proper treatment and vaccine, prevention and control seem to be the only way out.

ICMR-RMRC Gorakhpur is Regional Diagnosis Centre for lab confirmation of COVID-19 suspected cases through RT-PCR from 7 districts namely Gorakhpur, Maharajganj, Deoria, Kushinagar, Basti, Sant Kabeer Nagar and Siddharth Nagar. Apart from these districts, samples have also been tested from Ayodhya, Azamgarh, Etawah, Ballia, Mau and Ghazipur districts for some time.

Majority of positive cases have been reported from Basti, Sant Kabeer Nagar, Siddharth Nagar, Maharajganj and this shall involve other districts with passing time. More than of these cases were asymptomatic at the time of diagnosis and remained so till discharge after testing negative.

This study aims to explore associated factors responsible for infection, transmission, clinical manifestation, treatment offered and recovery rate as well protection against the disease.

Result and Conclusion

COMPLETED STUDIES 2

We started the study from Basti district on May 15, 2020. Data collection was done by In-depth interviews using a semi-structured schedule and a GPS device. We also utilized data available from ICMR portal.A total of 8488 subjects were screened for COVID-19 during the study period from March 23 rd to May 15th 2020. A total of 204

Table 1: Personal characteristics of SARS CoV-2 infected Individuals in North-Eastern Uttar Pradesh India (n=66)

Characteristics		Frequency (%)
Age in years	Median: 23.5; Range:0.25– 71 Y	
	10-19	21 (31.8)
	20-39	28 (42.4)
	40-59	12 (18.2)
	≥ 60	5 (7.6)
Gender	Female	20 (30.3)
	Male	46 (69.7)
Marital status	Married	33 (50.0)
	Unmarried	33 (50.0)
Type of family	Joint	31 (47.0)
	Nuclear	35 (53.0)
Smoking	Yes	8 (12.1)
	No	58 (87.9)
Tobacco chewing	Yes	13 (19.7)
	No	53 (80.3)
BCG status	Given	20 (30.3)
	Not known	46 (69.7)
Recent travel from outside district	Yes	26 (39.4)
	No	40 (60.6)

lab-confirmed cases were detected in the 7 districts of eastern Uttar Pradesh. The median age of cases was 25 years (range: 2 months-71 years) and 180 (88.2%) of them were males. 197 (96.5%) of them were asymptomatic at the time of diagnosis. Of them, 147 (72.05%) in-migrated during mass migration from different places of the country (mostly Mumbai and other places in Maharashtra) after countrywide lockdown. None of them had recently travelled from any foreign country. Infection transmission in the region could be broadly classified in two phases.

In first phase transmission was observed in three parallel situations:
First a localised cluster containing 17 lab confirmed cases in Basti, showing familial transmission along with transmission from a funeral of first reported case of the region where source of infection in the index case could not be identified but the district administration and health system of Basti was able to control further transmission from this cluster.
Second was infection among people who attended Tablighi Jamaat gathering. Total of 8 lab confirmed cases were directly linked to Tablighi Jamaat gathering. All of them were asymptomatic at the time of diagnosis and remained asymptomatic till recovery from infection. 6 of them were resident of Maharaj Ganj district 2 belonged to Sant Kabeer Nagar district but no transmission was observed to any of their contact. Third a local cluster of 24 infected individuals was observed in Maghar, Sant Kabeer Nagar where infection was brought in by a student who came from Deoband Saharanpur and stayed at home for 24 days before being isolated, coming in

contact with 35 people (28 family members and 7 relatives). Later 23 of them were tested positive for SARS CoV-2 infection. Hence first phase was successfully managed with contact tracing, containment, isolation and stopping further transmission.

The second phase starts with mass in-migration of labourers from different parts of the country. The initial success in control of transmission in the region was overshadowed with the mass in-migration of labourers. As of May 15th 2020 more than two third of total reported cases were migrant labourers.

2.4 Prevalence and abundance of ectoparasitic vectors of rickettsial pathogens and their animal hosts in areas reporting acute encephalitis syndrome (AES) in Gorakhpur district, Uttar Pradesh (ICMR-VCRC, Project)

Principal Investigator: Dr. C. Sadanandane
Co-PIs & Investigators: Dr. K. Zaman
Starting date: October 2019
Completion date:
Funding: ICMR, New Delhi

Objectives as approved

- To study the prevalence and seasonal abundance of ectoparasitic vectors of rickettsial pathogens and their animal hosts in areas reported with human cases of AES in Gorakhpur.

- To determine rickettsial infection rates in ectoparasitic vectors and animal hosts prevalent in the areas reported with human cases of AES.

Background

Schematic diagram for collection of ectoparasites and serological and molecular diagnosis of rickettsia pathogens in rodent/shrew blood samples and ectoparasites.
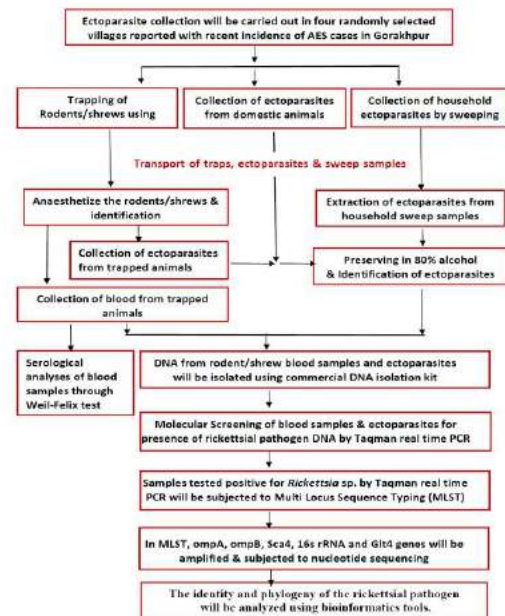
Result and Conclusions

No villages surveyed   : 4
Total No of Traps set   : 3412
No of rodents trapped   : 404
Trapping rate   : 11.8 %
No of Rodents screened : 404
Rodents infested with ectoparasite
        : (213/404* 100) 52.7 %
Rodent/shrew Predominant species
        Tick: *Rhiphicephalussanguinensis*
        : *(640/708*100) 90.4%*
        Flea: *Xenophsyllacheopis*
        : *(15/708*100) 2.17 %*
        Lice: *Polyplax spinulosa   :*
(1/708) 0.14 %
Domestic animals screening for ectoparasite:
No of domestic animals screened: 781
Ectoparasite infection rate   :
(318/781*100) 40. 7%
Predominant ectoparasite on Domestic Animal

Tick: *Boophilus microplus*
:*(480/823*100) 58.3 %*
Flea: *Ctenocephalides felis*
:*(36/823*100) 4.4 %*
Lice: *Haemapinus tuberculatus*
:*(56/823*100) 6.8 %*

2.5 National sero-surveillance for COVID-19

Principal Investigator: Dr G. R. Dwivedi
Co-PIs & Investigators: Dr R. Singh, Dr K. Zaman, Dr H. Deval, Dr A. K. Pandey
Starting date: May 2020
Completion date: June 2020
Funding: ICMR-RMRC, GKP

Objectives approved as

Primary objective

- Monitor the trend of seroprevalence against SARS-CoV-2 infection in the general population.

Secondary objectives

- Estimate the seroprevalence of SARS-CoV-2 infection in the general population
- Determine the risk factors for SARS-CoV-2 infection
- Determine the geographical spread of the infection in the general population

Background

Corona Virus Disease (COVID-19) has emerged as a pandemic and the infection (SARS-CoV-2) has now spread to more than 200 countries. As on April 13, 2020 globally 1.85 million cases and 114,253 deaths were reported. So far India has reported 9,152 cases and 308 deaths. WHO strongly recommends surveillance systems to do active case finding, testing and contact tracing. The WHO-China joint monitoring mission observed that among laboratory confirmed COVID 19 cases, approximately 80% were mild to moderate, 14% severe and 6% critical. Further the report of the mission observed that although asymptomatic infection had been reported, majority of these rare asymptomatic cases picked on date of identification/report went on to develop disease. The report concluded that the proportion of truly asymptomatic infections was unclear but appears to be relatively rare and does not appear to be a major driver of transmission.

One-time cross-sectional investigation is more suitable to be conducted after the peak of transmission of the epidemic. Establishing a longitudinal cohort in a pandemic situation will be resource intensive. India is still in the early stages of the epidemic; hence it may be worthwhile to consider repeated cross-sectional studies at the level of the general population. This may be useful to generate data on the extent of spread of SARS-CoV-2 infection in the community and inform public health response appropriately. It was proposed to establish community-based district level sentinel sero-surveillance system to monitor the transmission of SARS-CoV-2 infection in the general population. The initial survey would serve as baseline to determine sero-prevalence of COVID-19 infection in the community, while subsequent rounds would help to monitor the trends of infection in the community.

Result and Conclusion

For the first round of sero-survey, with the assumption of 1% sero-positivity, absolute precision of $\pm0.95\%$, confidence interval of 80%, we need to enrol 361 (rounded to 400 individuals) from 10 clusters in a district. The wider precision has been

taken to consider feasibility particularly in lockdown situation.

Sample size for subsequent rounds will be adjusted (to account for better precision and acceptable confidence interval) after analyzing the results from the first round of survey.

Table. 1: COVID-19 positive from studied clusters of Balrampur district

Cluster	Neg	Pos	Grand Total
Amrahwa	40	0	40
Bhusailia	45	0	45
Bisrampur	40	0	40
Fattepur	41	0	41
Gulriha Ahrauli	39	1	40
Itai Rampur	40	0	40
Kherika Masoompur	40	0	40
Lal Nagar	39	1	40
Sakri Kulya	38	2	40
Utraula (NPP) WARD NO.-0018	41	0	41
Grand Total	403	4	407

Table. 2: COVID-19 positive from studied clusters of Gonda district

Cluster	Neg	Pos	Grand Total
Alvalpur	40	0	40
Belbharia	40	0	40
Bhawanipur Khurd	40	0	40
Chatkanwa	40	0	40
Dhourhara Ghat	40	0	40
Kachnapur	40	0	40
Laxmanpur	40	0	40
Nandaur	39	0	39
Pure Badal	40	1	41
Ramapur	41	0	41
Grand Total	400	1	401

Table. 3: COVID-19 positive from studied clusters of Mau district

Cluster	Neg	Pos	Grand Total
Akauna	40	0	40
Ariyaso	41	0	41
Garib Patti	39	1	40
Ghutama	46	0	46
Itaura	45	0	45
Karmpur	40	0	40
Maryadpur	47	0	47
Maunath Bhanjan (NPP) WARD NO.-0012	45	0	45
Muhammadabad (NP) WARD NO.-0003	40	0	40
Tajpur	39	0	39
Grand Total	422	1	423

The study findings were useful to guide in designing and implementing appropriate containment measures.

2.6 Population-based sero-surveillance for SARS-CoV-2 infection transmission in India: Second survey, August 2020

Principal Investigator: Dr G. R. Dwivedi
Co-PIs & Investigators: Dr R. Singh, Dr K. Zaman, Dr H. Deval, Dr A. K. Pandey
Starting date: August 2020
Completion date: September 2020
Funding: ICMR-RMRC, GKP

Objectives approved as

Primary

- To estimate the seroprevalence for SARS-CoV-2 infection in the general population at the National level and determine the trend over time

Secondary

- To estimate the age- and sex-specific seroprevalence

- To determine the socio-demographic risk factors for SARS-CoV-2 infection
- To estimate the proportion of asymptomatic SARS-Cov-2 infections at community level
- To estimate the basic reproduction number (R_0) of SARS-CoV-2 infection

Background

Considering the highly clustered nature of SARS-CoV-2 transmission testing of a single household member could have underestimated the seroprevalence in the first survey. We may also have underestimated the seroprevalence if our selection missed clusters with higher prevalence including those among most of the metropolitan cities. Further, estimation of the infection fatality ratio (IFR) is influenced by age, gender, access to healthcare facilities, and presence of chronic comorbidities and this information was lacking in the first survey.

It is proposed to conduct the second round of serosurveillance to determine the trend in spread and burden of SARS-CoV-2 infection in the community as per change in epidemiology and public health response to the epidemic in the country.

Result and Conclusion

The seroprevalence obtained from the first survey for the selected districts (excluding containment zone) was 0.73% among the adult population. The doubling rate of cases in the country is approximately 4 weeks. Hence, the burden of infection is expected to become four times in August in comparison to the figure in May. Results of recent serosurveys in Delhi and Chennai indicate that the seroprevalence among 10-17-year-old children is similar to the adults. Considering a

seroprevalence of 3%, relative precision of 14%, confidence interval of 95%, and design effect of 3.5 the sample size is calculated to be 22,041. Assuming a refusal rate of 20% we will need to enroll 28,000 individuals across the country. We will allocate a minimum of 400 individuals to each of the 70 districts that were included in the first survey. Within each of these 70 districts, 40 individuals will be included for the survey from each of the same 10 sampling units (villages in rural are assigned and wards in urban areas) that were selected in the first survey.

Table. 1: COVID-19 positive from studied clusters of Balrampur district

Cluster	Tested	Negative	Positive	Positive %
Bhusailia	41	41	0	0.0
Amrahwa	40	38	2	5.0
Lal Nagar	40	40	0	0.0
Bisrampur	42	42	0	0.0
Gulriha Ahrauli	39	38	1	2.6
Sakri Kulya	40	35	5	12.5
Fattepur	40	40	0	0.0
Itai Rampur	43	42	1	2.3
Kherika Masoompur	42	41	1	2.4
Utraula (NPP) WARD NO: 0018	41	37	4	9.8
Total	408	394	14	3.4

Table. 2: COVID-19 positive from studied clusters of Gonda district

Cluster	Tested	Negative	Positive	% Positive
Bhawanipur Khurd	41	41	0	0.0
Belbharia	45	44	1	2.2
Laxmanpur	43	41	2	4.7

Pure Badal	40	39	1	2.5
Kachnapur	40	37	3	7.5
Nandaur	40	40	0	0.0
Dhourhara Ghat	41	40	1	2.4
Ramapur	44	43	1	2.3
Alvalpur	40	38	2	5.0
Chatkanwa	39	37	2	5.1
Total	413	400	13	3.1

Table. 3: COVID-19 positive from studied clusters of Mau district

Cluster	Tested	Negative	Positive	% positive
Ariyaso	39	38	1	2.6
Karmpur	40	37	3	7.5
Maryadpur	46	33	13	28.3
Akauna	40	39	1	2.5
Tajpur	39	36	3	7.7
Itaura	42	37	5	11.9
Ghutama	40	35	5	12.5
Garib Patti	40	39	1	2.5
Maunath Bhanjan (NPP) WARD NO: 0012	40	28	12	30.0
Muhammadabad (NP) WARD NO: 0003	40	31	9	22.5
Total	406	353	53	13.0

2.7 Population-based sero surveillance for SARS-CoV-2 infection transmission in India: Third survey, December 2020

Principal Investigator: Dr G. R. Dwivedi

Co-PIs & Investigators: Dr R. Singh, Dr K. Zaman, Dr H. Deval, Dr A. K. Pandey
Starting date: November 2020
Completion date: December 2020
Funding: ICMR-RMRC, GKP

Objectives approved as

Primary

- To estimate the seroprevalence for SARS-CoV-2 infection in the general population, aged 10 years and above, at the national level
- To estimate the seroprevalence for SARS-CoV-2 infection among healthcare workers at the national level

Secondary

- To estimate the seroprevalence for SARS-CoV-2 infection by age, sex, locality, occupation, symptom status, contact history, RT-PCR testing and confirmation status
- To compare the performance of antinucleocapsid and anti-S1 assays in detection of IgG antibodies against SARS-CoV-2 infection
- To determine the factors (COVID-19 positivity, duration since COVID-19 positivity, symptom status) influencing the performance of antinucleocapsid and anti-S1 assays in detection of IgG antibodies against SARS-CoV-2 infection

Background

SARS-CoV-2 poses a high occupational risk to healthcare workers who are at the forefront of management of COVID-19 cases in hospital settings. Knowledge of the burden of infection among healthcare workers is important to measure the risk of intrahospital and outside

hospital transmission of SARS-CoV-2, and evaluate the in-hospital infection control practices and adherence to non-pharmaceutical interventions as well. A sero-survey of SARS-CoV2, conducted in August 2020 by Brihanmumbai Municipal Corporation, NITI-Aayog and Tata Institute of Fundamental Research, in Mumbai found that 27% health workers had developed antibodies. Another study in a private hospital in Mumbai reported that 91% of 23 healthcare workers with a previous history of RT-PCR-confirmed COVID-19 infection, 70% with previous COVID-like symptoms, and 4.3% of asymptomatic healthcare workers tested positive for IgG antibody using Abbott CLIA test. Considering the lack of information at a country level there is a need to generate evidence on the burden of SARS-CoV-2 infection among healthcare workers, more so in light of the ongoing planning and prioritization for vaccination.

It is proposed to conduct the third round of serosurveillance to know the trend in spread and burden of SARS-CoV-2 infection in the community and healthcare workers as per change in epidemiology and public health response to the epidemic in the country.

Result and Conclusion

Third serosurvey was completed in December month from three districts of eastern Uttar Pradesh the observed seropositivity is given in below tables.

Table. 1: COVID-19 positive from studied clusters of Balrampur district

Cluster	Tested	Negative	Positive	% Positive
Bhusailia	40	30	10	25.00
Amrahwa	40	35	5	12.50
Lal Nagar	40	36	4	10.00
Bisrampur	36	34	2	5.56
Gulriha Ahrauli	39	35	4	10.26
Sakri Kulya	39	35	4	10.26
Fattepur	39	33	6	15.38
Itai Rampur	41	34	7	17.07
Kherika Masoompur	39	28	11	28.21
Utraula (NPP) WARD NO: 0018	39	28	11	28.21
Total	392	328	64	16.33

Table. 2: COVID-19 positive from studied clusters of Gonda district

Cluster	Tested	Negative	Positive	% Positive
Bhawanipur Khurd	43	37	6	13.95
Belbharia	41	34	7	17.07
Laxmanpur	40	29	11	27.50
Pure Badal	38	33	5	13.16
Kachnapur	40	37	3	7.50
Nandaur	40	40	0	0.00
Dhourhara Ghat	47	40	7	14.89
Ramapur	46	43	3	6.52
Alvalpur	42	38	4	9.52
Chatkanwa	40	32	8	20.00
Total	417	363	54	12.95

Table. 3: COVID-19 positive from studied clusters of Mau district

Cluster	Tested	Negative	Positive	% Positive
Ariyaso	43	31	12	27.91
Karmpur	43	31	12	27.91
Maryadpur	43	34	9	27.91
Akauna	40	33	7	30.00
Tajpur	43	38	5	27.91
Itaura	41	32	9	29.27
Ghutama	40	35	5	30.00
Garib Patti	41	30	11	29.27
Maunath Bhanjan (NPP) WARD NO: 0012	41	30	11	29.27
Muhammadabad (NP) WARD NO: 0003	43	34	9	27.91
Total	418	328	90	21.53

Table. 4: COVID-19 positive health worker from studied districts

District	Facility Name	Test	Positive	% Positive
Balrampur	Balrampur rural CHC	52	9	17.31
Balrampur	Tulsipur CHC	52	14	26.92
Gonda	Mankapur CHC	63	17	26.98
Gonda	Khugupur CHC	52	12	23.08
Mau	Kopaganj CHC	51	11	21.57
Mau	Mohamdabad CHC	57	12	21.05
Total		327	75	22.94

3.1 Association study of single nucleotide polymorphism in the gene coding for matrix metalloproteinase 9 with susceptibility to Japanese Encephalitis

Student's Name: Apoorv S Agrawal
Study: M.Sc Dissertation
Status: Completed
Guide: Dr H Deval

Objectives

- To find out whether single nucleotide polymorphisms in the MMP-9 gene (rs17576) is associated with susceptibility to the Japanese Encephalitis

Background

Japanese Encephalitis is one of the most common cause of viral encephalitis which cause Acute Encephalitis Syndrome (AES). The causative agent is Japanese encephalitis virus. Children upto 15 years of age are mostly are affected and are considered as a risk group for JE. But a smaller number of people can develop it into disease. Only 1 out of 250 cases becomes severe and can be fatal. Single nucleotide polymorphism (SNP) in the MMP-9 gene of the host could be associated with the disease severity as it can alter the function and structure of the protein.

Result and Conclusion

Allele frequencies and genotype frequencies were obtained from the SNPs under study. MMP9 Q279R A/G genotype had an association with Japanese encephalitis with a statistically significant P-value and odds ratio. MMP-9 Q279R (rs17579) A/G genotype was associated with susceptibility to Japanese Encephalitis.

3.2 Molecular characterization of dengue virus strains isolated from blood samples targeting C-prM gene region

Student's Name: Saurabh Mishra
Study: M.Sc Dissertation
Status: Completed
Guide: Dr H Deval

Objectives

- Detection of Dengue serotype targeting C-prM gene in whole blood specimens.
- Phylogenetic analysis of PCR amplified 511 bp C-prM gene for the characterization of dengue virus.

Background

This study was an attempt to characterize the strain of DV at molecular level targeting C-prM intergenic region based on sequencing and their phylogenetic analysis among the available strains of DV from the database. The present study was undertaken from 60 whole blood specimens from dengue febrile cases. Molecular characterization of DV strains followed by the detection was done by C-prM gene sequencing. The finding of this work is the co-circulation of three serotypes (DV-1, 2, and 3) of dengue virus, common in India. The DV -1 and 3 are reported for the first time in eastern UP region. The information presented above is valuable for vaccine clinical trial and disease control.

Result and conclusion

The study was undertaken using 60 whole blood specimens from dengue febrile cases during 2017-2019 from Gorakhnath Hospital, Gorakhpur. Preliminary Screening was conducted using NS1 antigen ELISA further molecular characterization of DV strains was done
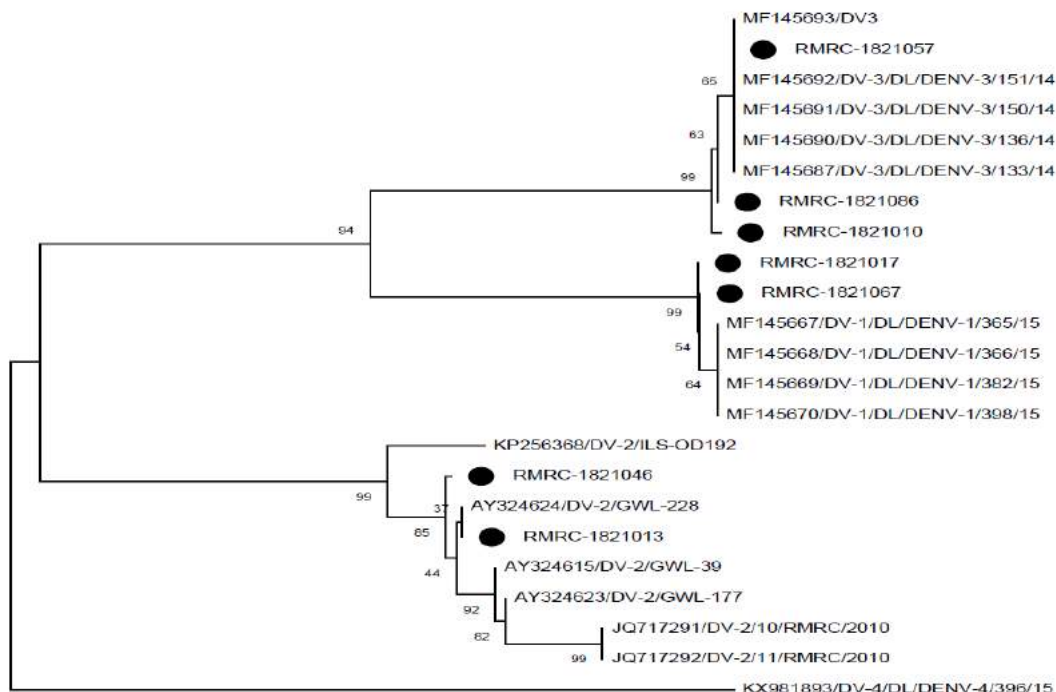
Figure: A phylogenetic tree constructed by maximum likelihood of DV 1, DV 2 and DV 3 strains isolated from eastern Uttar Pradesh region.

by C-prM gene. This study found the co-circulation of three serotypes (DV-1, 2, and 3) of dengue virus in eastern Uttar Pradesh region. The DV -1 and 3 are reported for the first time in the region.

3.3 Study on Different Mechanism of Resistance and Drug Resistance Reversal Potential of Plant Compounds against Critical Superbugs

Student's Name: Umme Yasmeen
Study: M.Sc Dissertation
Status: Completed
Guide: Dr G R Dwivedi

Objectives

- Procurement of different bacterial isolates
- Identification and characterization of bacterial pathogens
- Resistance sensitivity profiling of different bacterial isolates
- To elucidate the mechanism of resistance in bacterial pathogens
- Drug resistance reversal potential of plant-based compounds and their derivatives

Background

Pseudomonas aeruginosa, *Acinetobacter baumannii* and the members of Enterobacteriaceae family (*E. coli* and *Klebsiella pneumoniae*) are categorized in critical group. There are only few antibiotics options for the treatment of these critical superbugs Few antibiotics such as aminoglycosides, polymyxins, tigecycline, and carbapenem group of antibiotics are associated with the treatment of these superbugs. Many antibiotics used in

combinations, such as ceftazidime/avibactam, meropenem/ vaborbactam ceftolozen /tazobactam. These superbugs acquire different mechanism of resistance to

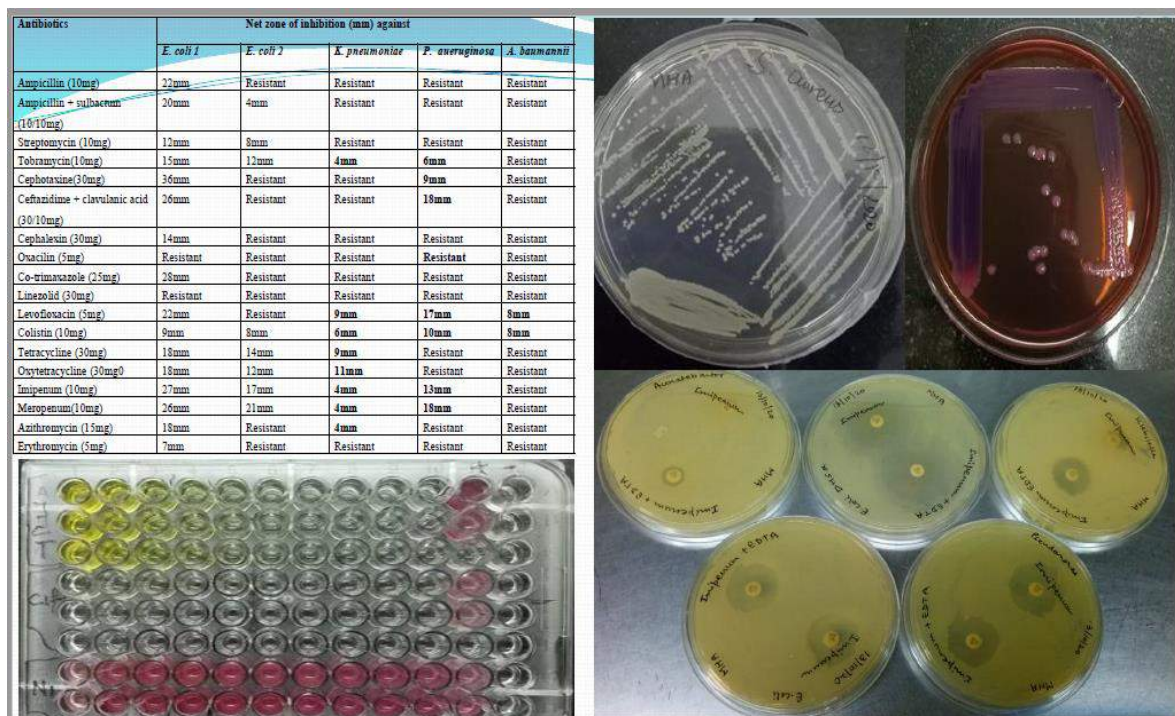| Antibiotics	Net zone of inhibition (mm) against				
	E. coli 1	E. coli 2	K. pneumoniae	P. aueruginosa	A. baumannii
Ampicillin (10mg)	22mm	Resistant	Resistant	Resistant	Resistant
Ampicillin + sulbactam (10/10mg)	20mm	4mm	Resistant	Resistant	Resistant
Streptomycin (10mg)	12mm	8mm	Resistant	Resistant	Resistant
Tobramycin(10mg)	15mm	12mm	4mm	6mm	Resistant
Cephotaxine(30mg)	36mm	Resistant	Resistant	9mm	Resistant
Ceftazidime + clavulanic acid (30/10mg)	26mm	Resistant	Resistant	18mm	Resistant
Cephalexin (30mg)	14mm	Resistant	Resistant	Resistant	Resistant
Oxacilin (5mg)	Resistant	Resistant	Resistant	Resistant	Resistant
Co-trimaxazole (25mg)	28mm	Resistant	Resistant	Resistant	Resistant
Linezolid (30mg)	Resistant	Resistant	Resistant	Resistant	Resistant
Levofloxacin (5mg)	22mm	Resistant	9mm	17mm	8mm
Colistin (10mg)	9mm	8mm	6mm	10nm	8mm
Tetracycline (30mg)	18mm	14mm	9mm	Resistant	Resistant
Oxytetracycline (30mg0	18mm	12mm	11mm	Resistant	Resistant
Imipenum (10mg)	27mm	17mm	4mm	13mm	Resistant
Meropenum(10mg)	26mm	21mm	4mm	18mm	Resistant
Azithromycin (15mg)	18mm	Resistant	4mm	Resistant	Resistant
Erythromycin (5mg)	7mm	Resistant	Resistant	Resistant	Resistant

Figure 1: Anti-bacterial susceptibility / resistance profiling of bacterial strains

counter balance the existing antibiotics, such as inactivation of antibiotics (by hydrolysing enzyme beta lactamases), biofilm formation and change in membrane permeability (down regulation of porins and over expression of efflux pumps).

Result and conclusion

Emergence of methicillin resistant *Staphylococcus aereus* (MRSA) and multidrug resistant tuberculosis (MDRTB) strains change the energy and direction of antibacterial drug discovery and development. From 1990-2010 institutional and industrial companies were focusing their research to find out the agents effective against MRSA and MDRTB. During this time gap of negligence gram negative bacteria acquired different category of

resistance to multiple antibiotics. Many of the infections caused by critical superbugs now become untreatable. In view of above problems and lack of novel antibiotics/ combinations the present study was carried out to explore the antibacterial drug resistant reversal potential of plant-based compounds using E. coli as a model system. The plant compounds were able to reduce the MIC of azithromycin up to 4-fold.

4.1 Research Article

1 Prakash Gangwar S, Thangaraj JWV, Zaman K, Vairamani V, Mittal M, Murhekar M. Sequelae Following Acute Encephalitis Syndrome Caused by Orientia Tsutsugamushi. Pediatr Infect Dis J. 2020 May;39(5):e52-e54. doi: 10.1097/INF.0000000000002595.

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Pati S, Patil S, Sarkar K, Singh S, Kant R, Tripathy S, Toteja GS, Babu GR, Kant S, Muliyil JP, Pandey RM, Sarkar S, Singh SK, Zodpey S, Gangakhedkar RR, S Reddy DC, Bhargava B. Prevalence of SARS-CoV-2 infection in India: Findings from the national serosurvey, May-June 2020. Indian J Med Res. 2020 Jul & Aug;152 (1&2):48-60.

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4.2 Review Article

- Rout UK, Sanket AS, Sisodia BS, Mohapatra PK, Pati S, Kant R, Dwivedi GR. A Comparative Review on Current and Future Drug Targets Against Bacteria & Malaria. Curr Drug Targets. 2020;21(8):736-775.

4.3 Editorial

- GR Dwivedi; "Role of botanicals/endophytic compounds in modulation of multidrug transporters" Current Topics in Medicinal Chemistry, 19(10): 753.

4.4 Book Chapter

- Dwivedi GR, SisodiaBS, Shikha. 2019. Secondary metabolites: Metabolomics for secondary metabolite. In New and Future Developments in Microbia l(Biotechnology and Bioengineering:Microbia lSecondary Metabolites Biochemistry and Applications V.Gupta&A.PandeyEdi.;Elsevier

publication, Radarweg29, POBox211, 1000AE Amsterdam, Netherlands. DOI:https://doi.org/10.1016/B978-0-444-63504-4.00022-0

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SinghK, MohapatraPK, PatiS, DwivediGR*.2019. Genetics and Molecular Biology of Encoding Cephalosporin Biosynthesis in Microbes. In New and Future Developments in Microbial (Biotechnology and Bioengineering: Microbial Genes Biochemistry and Applications. H.B.Singh, V.Gupta, &Edi.;Elsevier publication, Radarweg 29,POBox211,1000AE Amsterdam, Netherlands. 63503-7.00002-4. ISBN: 9780444635037,pp.25-34.

4.5 Abstract

- A decade of acute encephalitis syndrome (AES) cases in eastern Uttar Pradesh, India: Etiological scenario and preventive strategies (2010–2019).H. Deval, R. Kant, V.P. Bondre, M. Mittal, M. Murhekar, J.W.V. Thangaraj, K. Zaman, A.K. Pandey, R. Singh, B.R. Misra, S.P. Behera, N. Kumar, P. Shankar, N. Srivastava. Emerging & re-emerging infectious diseases / International Journal of Infectious Diseases (2020).

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EVENTS & ACTIVITIES 5

5.1 Training, Workshops, Conferences & Meetings conducted

- **ICMR Training on Biomedical and Health Research Ethics** was jointly organized and hosted by ICMR-RMRC, Gorakhpur; ICMR-NCDIR and BRD Medical College, Gorakhpur on 21st and 22nd January 2020. The main aim of this training was to develop adequate knowledge and skill among biomedical scientists, medical faculty and ethics committee members regarding various ethical considerations and maintenance of ethical standards involved in biomedical and public health research. In this training faculty of ICMR-RMRC Gorakhpur, AIIMS Gorakhpur, various medical colleges of this region and members of ethical committees of this region were participated to understand the conduct of ethical health research in India.

- An Open discussion was organized among staff and scientists of RMRC, Gorakhpur on the topic "**Contribution of Dr. B. R. Ambedkar to the constitution of India**" on 28 January 2020.

- **A social awareness program** was started at HDSS villages of Gorakhpur district, in this program, social awareness was created by distributing info-graphics on awareness/ prevention of Japanese Encephalitis and swachchha bharat abhiyan among these villages in the month of January-2020.

- **Health Awareness Camp** was held in the Primary School of Rasoolpur Gunia of the HDSS village in Bhathat Block,

Gorakhpur on 27 January 2020 on "Health & Hygiene" which was headed by Dr Rajni Kant, Director, ICMR-RMRC, Gorakhpur along with the Dr Kamran Zaman, Scientist C and principal investigator of HDSS Project. In this camp:

- Dr. Rajni Kant addressed the importance of health & hygiene and the history of medical science. He also released the infographics on "**Swatch Bharat Abhiyaan**".

- Dr. Kamran Zaman delivered a talk on the Importance of HDSS project and its work in the villages.

- Dr. Girijesh Kumar Yadav talked about the "Psycho-social and behavioural factors of health" along with the awareness of JE/AES.

- Mr. Kaushik Kumar delivered a talk on the importance of hygiene and cleanliness and its direct relationship with health. To aware the children and their parents regarding hand washing, steps of hand washing were demonstration.

- **National Science Day** and debate competition on Citizen Duties was organized on 28 February 2020

- **International Women Day** was organized on 6 March 2020. A lecture was delivered by **Dr Sunitha K**., Department of Botany, DDU Gorakhpur university on the '**Use of traditional medicine in gynaecological Problems**' on this occasion.

- **Inauguration of Bio Safety 2+ level laboratory** by **Yogi Aditya Nath Ji, Honourable Chief Minister, Uttar**

Pradesh at ICMR-RMRC, Gorakhpur on 6 July 2020.

- Hands on training on COVID-19 RT PCR testing was organised by RMRC, Gorakhpur on 23 July. Pathologists and laboratory technicians attended this training.

- A virtual seminar on **health crisis management and preparedness** was organised on the occasion of second foundation day of ICMR- RMRC, Gorakhpur on 2 September 2020.

  - The topic of keynote lecture was **Research and Development action plan for epidemic preparedness and management** that was detailed by **Dr Sanjay Mehendale**, Director Research, P. D. Hinduja Hospital & Medical Research Centre, Mumbai and Former Additional D.G, ICMR, New Delhi.

  - **Dr P. K. Srivastava**, Former Joint Director, NVBDCP, New Delhi delivered his lecture on **Vector borne diseases in India- The Perception and management.**

  - **Dr P. L. Joshi**, Joint SAC Chairman and Former Director, NBVDCP, New Delhi delivered his lecture on **Health Crisis Management.** Directors of various institutes of ICMR, staff of ICMR RMRC, GKP and staff of BRD Medical College actively participated in This seminar.

- **A five-day COVID-19 RT PCR training program** for scientists and technicians of Uttar Pradesh health department was organised from 27 to 31 October 2020. Scientist and technicians of Pratapgarh district, Uttar Pradesh actively participated in this program.

- RMRC, GKP celebrated "**Curtain raiser event**" of IISF-2020 on 9 December 2020. Dr Balram Bhargava, D.G., ICMR & Secretary, DHR addressed the event online and briefed about health research conclave. Dr Surekha Kishore, Director AIIMS, Gorakhpur detailed about health research development.

- Two days **Health and Demographic Surveillance System: staff training** was carried out from 1 to 2 February 2021 at RMRC, Gorakhpur.

- RMRC staff Covid-19 vaccination was initiated on 5 February 2021

- International Women's Day was celebrated by RMRC on 8 March 2021. On this occasion a talk was delivered by Dr Pragya Yadav, Scientist E, National Institute of Virology, Pune on challenges of COVID-19, isolation of SARS-CoV-2 virus and its vaccine development strategies.

5.2 Training, Workshops, Conferences attended

- Dr Rajni Kant, Director RMRC, Gorakhpur delivered his invited lecture in national symposium on arboviral diseases 2020 at laboratory of public health entomology, Mohanlal Sukhadiya University, Udaipur on 4 January 2020.

- Dr Hirawati Deval delivered her invited lecture on Dengue virus Serotypes circulating during 2015-19 in Eastern Uttar Pradesh, India at NSAD 2020, Mohanlal Sukhadia University, Udaipur on 5 January 2020.

- Dr Rajeev Singh delivered his invited lecture on Non-invasive method of Japanese virus diagnosis at NSAD 2020, Sukhadia University, Udaipur.

- Dr Brij Ranjan Misra delivered his invited lecture on Dengue vector dynamics and breeding preferences in acute encephalitis affected area of Eastern Uttar Pradesh, India at NSAD 2020, Mohanlal Sukhadia University, Udaipur on 5 January 2020.

- Dr Kamran Zaman attended ICMR Training on Biomedical and Health Research Ethics at BRD Medical Gorakhpur on 21st -22nd January 2020

- Dr Rajni Kant delivered an invited talk on "**Epidemiology of Scrub Typhus in Uttar Pradesh**" in the 'CME on Neglected Tropical Disease' at KGMU, Lucknow on 30 January 2020

- Dr Ashok Pandey and Dr Kamran Zaman attended the "CME on Neglected Tropical Disease' at KGMU, Lucknow on 30th January 2020

- Dr Gaurav Raj Dwivedi attended Brainstorming Meeting' on investigators for the development of multi-centric project entitled **"***Prevalence of Asymptomatic Parasitemia among residents of areas with Annual Parasite Incidence (API) more than two: A Community Based Multicentric Study"* on 19 - 20 February 2020 at ICMR Headquarters, New Delhi

- Dr. Hirawati Deval delivered invited lecture on "Single nucleotide polymorphisms in the TNFA, CCR5 and CD209 genes are associated Japanese Encephalitis in children from Northern India" at national seminar on "Omics for Food, Health and Environment" (OFHE-2020) 14-15th February 2020 held at DDU University.

- Dr Kamran Zaman delivered an invited talk on "Role of presumptive treatment of acute febrile illness with Doxycycline/ Azithromycin in preventing Acute Encephalitis Syndrome, Gorakhpur, India, 2018" in the National Conference on OMICS for Food, Health &

Environment (OFHE 2020) at DDU Gorakhpur University on 15 Feb 2020.

- Dr Gaurav Raj Dwivedi Attended National Seminar on (OFHE-2020) 14-15th February 2020 *at* Department of Biotechnology, D.D.U Gorakhpur University and delivered his lecture on the topic *"*Novel curcumin-based derivative (Van-D) inhibits MDR P. aeruginosa via potentiation of tetracycline'**.**

- Dr. Rajeev Singh delivered oral presentation on the title "Genetic characterization of *Orientia tsutsugamushi* strains from hospitalized acute encephalitis syndrome cases in eastern Uttar Pradesh, India during 2016-17" OFHE-2020 on 15 February 2020 at Department of Biotechnology, DDU Gorakhpur University, Gorakhpur.

- Dr Kamran Zaman Attended "ICMR Training on Responsible Conduct of Research & Publication Ethics" at NCDIR, Bangalore on 28th February 2020.

- Dr Kamran Zaman delivered a guest lecture on CORONA Virus: an update for State health Medical Officers & technician organized by CMO Gorakhpur & Wish foundation at Gorakhpur in March 2020.

- Dr Gaurav Raj Dwivedi given his invited lecture on *"National Education Policy 2020*" 12 September 2020 12.00-1.00pm at IIMT College of Medical Sciences, The **IIMT University,** Meerut, Uttar Pradesh, India.

COMMITTEES ⑥

Pre-SAC Expert Group, ICMR-RMRC, Gorakhpur

1. **Dr. P. L. Joshi**,   Chairman
   Former Director,
   NVBDCP, New Delhi

2. **Dr. Manoj Murhekar**,   Member
   Scientist G & Director,
   ICMR-NIE, Chennai

3. **Dr. Vishnu Vardhana Rao**,   Member
   Scientist G & Director,
   ICMR-NIMS, New Delhi

4. **Dr. Aparup Das**,   Member
   Scientist G & Director,
   ICMR-NIRTH, Jabalpur

5. **Dr. Deepak Gaur**,   Member
   Professor and Group Leader,
   Laboratory of Malaria, SBT, JNU & IAVI, Delhi

6. **Dr. Sanghamitra Pati**,   Member
   Scientist G & Director,
   RMRC, Bhubaneswar

7. **Dr. Ashwani Kumar**,   Member
   Scientist G & Director,
   ICMR-VCRC, Puducherry

8. **Dr. Amita Jain**,   Member
   Professor & Head,
   Microbiology, KGMU, Lucknow

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