HSNC UNIVERSITY, Mumbai

Faculty of Science and Technology

Organizes

National Virtual Conference on

COVID-19 times: Opportunities in Difficulties

2nd – 3rd July, 2021

Conference Proceedings

K. C. College

Departments of Biotechnology and Microbiology

Theme of the Conference:

"Change is the only constant"

The age-old aphorism has been a persistent reminder to adapt to the NEW NORMAL. COVID-19 has speedily spread around the globe, posing enormous health, economic, environmental and, social challenges to the entire humanity. Being an incredible accelerator of distant learning, the COVID-19 pandemic provided academicians a new vision to enter into untapped avenues. In this vein, HSNC University strives to provide continuous guidance and support to the educational, industrial, and medical fraternity in creating engaged and learned future citizens.

As the world orientates itself with the norms of the highly dynamic global environment, this conference is an initiative is to engage the academic and scientific community and other key stakeholders involved in the battle against COVID-19 across the country, to understand the current research scenario, how it contributes to humanity's collective efforts to find a solution, a human endeavor. These dedicated discussions and deliberations would aim to contribute to the nation's intellectual wealth.

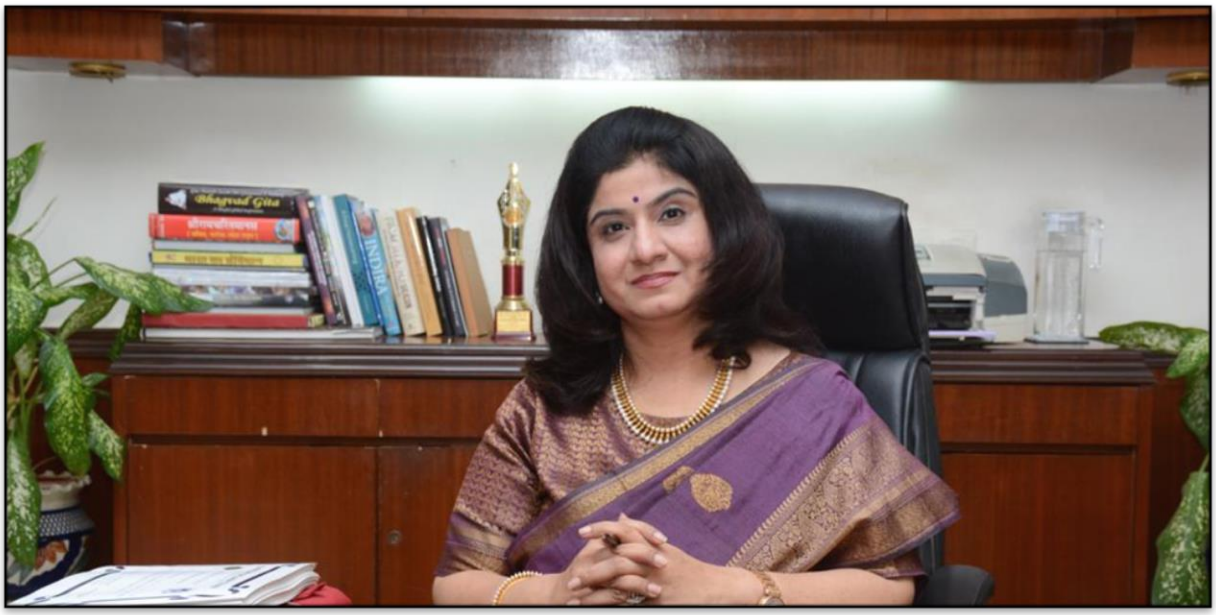
The conference focused on versatile themes such as:

- *Pathogenic Viruses & Zoonotic Infections*
- *Advancements in COVID-19 Drug &Vaccine Generation*
- *Role of molecular and protein diagnostics*
- *Challenges to an infection-free future generation*
- *Emerging technologies and opportunities amidst COVID-19*

The conference agenda was to bring out the academic deliberations amongst professionals, scholars, and students, to provide diverse perceptions and vision into new challenges and possibilities in the biology sector. The conference aimed to devise competent and sustainable strategies to generate the necessary momentum for recasting work practices and scientific research.

Table of Contents

Principal's Address

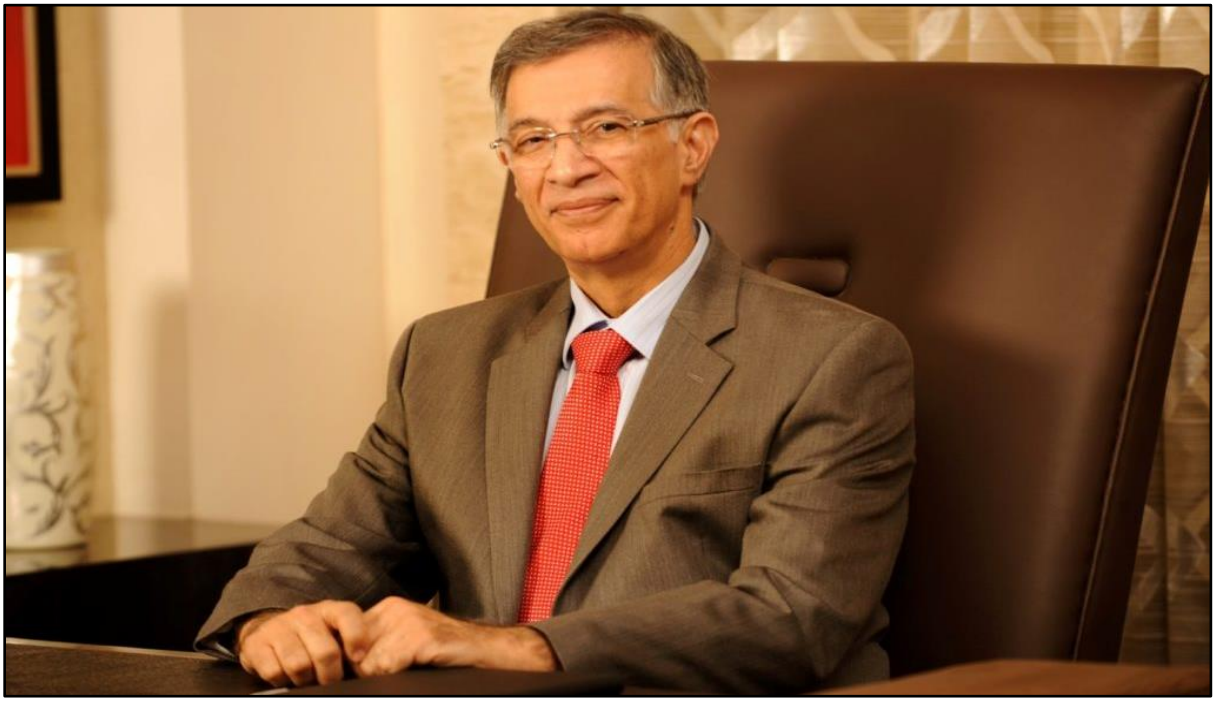


As the Principal of KC College, I am filled with satisfaction and pride – satisfaction at the accomplishments of my teachers and pride in our contribution to the nation's fight against the pandemic. My teachers have detoured before mastering and excelling at online conferences and academic e-gatherings. The two-day national conference on COVID-19: Opportunities in Difficulties is a brainchild of our efforts to train and prepare ourselves for what lies in the future. The goal of the conference is to enlighten and sculpt the novice researchers of the nation into brilliant knowledge creators. Through this conference, we want to inculcate awareness and preventive measures for COVID 19 amongst all citizens of the society. Every participant of this conference is an important mediator of health education and disease prevention. The agenda of the conference is to bring out the academic deliberations amongst professionals, scholars, and students to provide diverse perceptions and vision into new challenges and possibilities in the biology sector. These dedicated discussions would aim to contribute to the nation's intellectual wealth.

By this, we sow the seeds of a "scientifically aware" India, whose citizens feel safe and secure amidst a global emergency.

Dr. Hemlata K. Bagla,
Principal, K.C. College
Senior Dean – Science & Technology, HSNC University

Provost's Note



The coronavirus pandemic unlocked a Pandora's Box by locking millions in their own homes. COVID-19 has speedily spread around the globe, posing enormous health, economic, environmental, and social challenges to the entire humanity. The COVID-19 pandemic provided academicians a new vision to enter into untapped avenues, thus serving as an incredible accelerator of distant learning. In this vein, HSNC University strives to provide continuous guidance and support to the educational, industrial, and medical fraternity in creating engaged and learned future citizens. This conference is a dream realized from the challenges faced by each one of us to seek out opportunities.

As leaders and members of this academic institution, we are driven by the purpose to extend our support to the nation's cause. As we are adapting to the "new normal", we are, however, uninformed of the "norms" of the new normal. This conference is an initiative is to engage the academic and scientific community and other key stakeholders involved in the battle against COVID-19 across the country to understand the current research scenario and how it contributes to humanity's collective efforts to find a solution.

Dr. Niranjan Hiranandani,
Provost & Trustee, HSNC University

Vice Chancellor's Message

India is facing the mass challenge of the global emergency of COVID-19, and we, as academic leaders, are committed to providing constant guidance to the educational, industrial, and medical fraternity. As the world habituates itself with the new normal, what might be some of the unexplored avenues of innovation in pharmaceuticals, vaccine development, diagnostics, and allied practices will help generate the necessary momentum in scientific research. The objective of this national conference is to encourage the amateur researchers of the country to fuel India's scientific wealth. Through this gathering, we aim to promote measures for COVID 19 among all. The HSNC University thrives on unifying academic and industry experts, and this conference is our collaboration with India's renowned scientists, teachers, and students.

Prof. Dinesh Panjwani,
Hon'ble Vice-Chancellor, HSNC University, Mumbai

Convenor's Remark

The honor of being the convenor of the National Conference on COVID 19 – Opportunities in Difficulties has met with responsibility and gratitude. Heading the Departments of Biotechnology & Microbiology instills in me the responsibility to bridge the gap between education and industry. Through this conference, we have connected the country's top-notch scientific talents to young learners and academicians. Our invited speakers are outstanding researchers and distinguished personalities in the field of disease and prevention. They have garnered years of experience and have had the noble opportunity to work for the country during the pandemic. Every session of the conference highlights various aspects of COVID, educating on the ongoing situation and the advancements to improvise it. The conference focuses on devising competent and sustainable strategies to generate the necessary momentum for recasting work practices and scientific research.

Being guarded by strict boundaries of social distancing and restricted to approach experts in the field of disease and medicine to guide us, the conference agenda is designed to address the health and safety concerns of our citizens. The conference has witnessed massive participation from all parts of the country, and we are pleased to do justice to its cause.

Dr. Sejal Rathod,
Conference Convenor,
Head, Dept of Biotechnology & Microbiology, K.C. College

SPEAKER'S ABSTRACT

Possibility of COVID-19 third wave- Challenges from vaccination to mutations

Dr. V. Ravi MD, FAMs, FASc, FASTMH

Nodal officer for genomic confirmation of SARS CoV-2, Government of Karnataka,
Retired Professor of Neurovirology,
NIMHANS, Bangalore

Late December 2019, there emerged a novel coronavirus called SARS CoV-2, severe acute respiratory syndrome Coronavirus-2. Coronaviruses as a family are not new to humankind, they have been around for 50 to 60 years and they cause infections in humans, animals, and birds. As far as humans are concerned, before the advent of SARS CoV-2, there were six human coronaviruses, 4 of which used to cause mild infections like upper respiratory infections and gastrointestinal infections. The first severe acute respiratory syndrome by coronavirus was detected at the beginning of this century, in the year 2002-2003, that originated in southern China and spread to many countries but India was spared due to containment measures. In the year 2012, we had a related respiratory syndrome virus from Middle East, known as MERS Coronavirus that spread to some countries and still causing infections. Coronavirus derives its name from its structure; spherical and its surface is studded with spike proteins that give the virus a shape of a crown. They are widely distributed in nature, most importantly they spill over from one species to another making them cause pandemics.

Records from Spanish flu (1918-1919) show three waves of different magnitude, the first being short followed by a huge second wave with a gap of 3-5 months. The third wave, recurred, in a gap of 3-4 months. All respiratory pandemics occur in waveforms.

Restrictions imposed by the government and responsible behavior of citizens help in reducing the intensity of the wave.

The second wave of COVID-19 in India happened in March- April 2020 and was 5 times greater in magnitude than the first wave. India being a populous country, the number of cases that were encountered was very high. Factors that ignited the second wave were super spreading events in towns and cities, lack of responsible COVID appropriate behavior like crowding, conducting rallies during elections, religious events, etc. The emergence of new variants SARS CoV-2, which are more infectious, was also observed during the second wave. Consequently, the second wave was steep and huge.

Small super-spreading events lead to a major outbreak, which signals that a slowdown is the need of the hour. In the first wave, importance was given to saving lives, which lead us to complete lockdown. As livelihood became an issue, things were liberalised. Whenever there is a small surge in any locality, one should immediately impose curbs, lockdowns, or contain the zone to prevent the spread. The intensity of the third wave is difficult to predict as it depends on the COVID appropriate behavior of the people. IIT- Kharagpur predicts a third wave in India between September 2021 and January 2022. Responsible behavior of citizens, more people getting vaccination can lead to a shallow wave. The third wave is likely to happen since SARS CoV-2 is a new virus and immunity to the virus can be gained only by vaccination or recovery through infection. Children will be more vulnerable as vaccines are not licensed for them and therefore paediatric intensive care units, ventilators need to be set up on war foot. Care should be taken to keep the test positivity rate (TPR) close to 5%. For every positive person, contact tracing of a minimum of 20 individuals should be carried out.

Enhanced sequencing of the SARS CoV-2 genome will help in the identification of its variants. As the virus multiplies, it makes errors in its genome as the enzyme RNA dependent RNA polymerase lacks proofreading activity. When such mutations accumulate in key areas, there are changes to the protein structures on the virus that renders the virus infectious. According to the Darwinian principle, only the fittest can survive as a result of which less infectious virus will not be viable. The pandemic has allowed the virus to spread to many individuals, thereby creating more changes in its structure, which leads to emergence of variants. Another reason for the emergence of variants is immune pressure that is a result of infection, plasma therapy, or vaccination. The first variant was detected in late February 2020, reported from Italy, and showed a mutation in spike protein (Aspartic acid, position 614 mutated to Glycine) and it rendered the virus far more infectious than the original Wuhan virus. More than 50% of infections reported worldwide, thereafter, was by this clade. Recent variants are shown to have the same mutations and some additional mutations in spike proteins and other regions. In the last six months, four important variants have emerged namely alpha (UK variant),

beta (South African variant), gamma (Brazil variant), and delta (Indian variant). Clinical implications of these variants include better transmissibility, virulence, and antigenicity. Delta variants have 60% more transmissibility than the alpha variant and 160% more than the parent virus. India has started sequencing for variants from January 2020 and has established the Indian SARS CoV-2 Genomic Consortium (INSACOG) between the Ministry of Health and Department of Biotechnology. 28 government laboratories are added to this consortium. INSACOG has sequenced 45,000 samples and has contributed globally in the detection delta and delta plus variants. Fifteen samples per site collected are sent every 15 days to the respective Genomic lab. The samples comprise of international travellers, representatives from clusters or focal outbreaks, cases of COVID-19 reinfection, infection in individuals vaccinated with two doses and completed 15 days after the second dose, clusters with severe morbidity or mortality, paediatric cases. INSACOG studies show that from the start of January when the UK variant entered India, it led to the emergence of the local delta variant that completely replaced the UK and other variants by end of March. Delta plus, a sub-lineage of delta variant, characterised by a change from lysine to asparagine in the spike protein is the new variant. Theories suggest recombination events lead to the emergence of delta plus variants. These variants are not of concern as of date since increased transmissibility is not observed for them.

Vaccines currently in use were developed in a span of six months. Two new platforms were utilised in the development of vaccines- 1. Use of genetic material (RNA) encapsulated in lipid envelope 2. Piggybacking spike protein in other host viruses (vector vaccine). COVID-19 vaccine is the largest vaccination program in the history of humankind. All the vaccines licensed for use are given in two doses with varying duration of time between two doses. As of now, the Government of India does not permit interchangeability in vaccine doses, but trials are going on for the same. India's vaccination coverage has reached 34 crores of the population for a single dose and about 5% percent have received two doses. ICMR –NIE study on police personnel in the state of Tamil Nadu suggests that the one dose of vaccine is 82% effective in preventing death and two doses provide 95% efficacy. Studies by National Institute of Virology shows that Covaxin developed by Bharat biotech generates an equal amount of neutralizing antibody against UK, Delta as well as Brazilian variants. Vaccination guarantees protection against severe infection and death but cannot completely prevent COVID-19 infections.

To summarise, SARS CoV-2 is a new pathogen, contagious, and capable of causing enormous health, economic and societal impacts. Immunity against COVID-19 infections can be gained only via infection or vaccination. SARS CoV-2 variants will continue to emerge and all vaccines developed until date are effective against SARS CoV-2 and its variants.

Living with COVID-19, Occupational safety and Health

Dr. Abhay Chowdhary

Professor, Head of Microbiology,
D.Y. Patil University School of Medicine, Navi Mumbai.

COVID-19 pandemic had various ramifications leading to occupational hazards. Occupational Health is a subfield of environmental health, deals with workplace health and safety. There are five types of hazards in the workplace: physical, chemical, biological, ergonomics & psychological hazards. Occupational health & safety is a critical aspect of an effective safety program, which requires assessment of hazards at the workplace.

Hierarchy of occupational safety involves elimination considers that if the task is not necessary then consider not doing it, substitution with alternate means that involves a lower risk of exposure, Engineering controls involve use of mechanical equipment to control the exposure to hazard, administrative controls like changing or modifying acts for reducing transmission, disinfection schedules, population density limitations. For reducing the exposure of COVID-19, use gowns, surgical masks, gloves, etc.

The protection of health care workers is of priority in response to the outbreak for which there are guidelines given by WHO & by Govt. of India. Also with respect to education, there are guidelines given by Ministry of Education, India for E-learning, reopening or closing of campus, etc.

SARS-CoV-2 spreads by Respiratory droplets and aerosols generated when you cough, sneeze, breath, sing, or shout, close, prolonged personal contact, such as touching or shaking hands, touching something with the virus on it, then touching your mouth, nose, or eyes with unwashed hands. To prevent the spread of COVID-19: Clean

your hands often. Use soap and water, or an alcohol-based hand rub, maintain a safe distance from anyone who is coughing or sneezing, wear a mask, do not touch your eyes, nose, or mouth, and cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze. Guidelines for site safety like for drivers or visitors or children in parks are also specifically given. Maintaining COVID appropriate behavior like greeting without physical contact, maintain physical distance, avoid unnecessary travel, do not circulate social media posts, which carry unverified or negative information, seek psychological support for any stress or anxiety. Points to prevention of spread of it at workplace like being vaccinated, avoiding closed space or contact along with general precautionary measures should be kept in mind. In addition, there are guidelines made available by WHO for non-healthcare workers, which can be referred to. The impact of this pandemic has also been observed on the economy. General guidelines for travellers should be followed. Different types of masks are available like the disposable mask, medical-grade surgical mask, N95 respirator that can be used depending upon the situation. Mask should be worn appropriately. Therefore, taking precautions & vaccination are the key ingredients to fight against COVID-19.

Host-directed therapy against SARS-CoV-2: Potentials and Perspectives

Dr. Indranil Banerjee

Assistant Professor, Dept. of Biological Sciences
Indian Institute of Science Education and Research, Mohali (IISER Mohali)

Coronaviruses (CoVs) represent a related group of enveloped, positive-sense RNA viruses infecting mammals and birds. CoVs are members of the subfamily Coronavirinae in the family Coronaviridae and the order Nidovirales. Based on their phylogenetic relationships and genomic structures, the subfamily Coronavirinae is divided into four genera: alpha, beta, gamma, and delta CoVs. Two alpha CoVs (HCoV-229E and HCoV-NL63) and two beta CoVs (HCoV-OC43 and HCoV-HKU1) induce only mild upper respiratory diseases in humans, although some of them can cause severe infections in infants, young children, and elderly individuals. Zoonotic transmissions of two human CoVs (MERS-CoV and SARS-CoV) in the last two decades became a major medical concern. The recent emergence of another highly pathogenic human CoV i.e. SARS-CoV-2 posed a global health emergency due to its rapid transmission across populations and the high mortality, especially among the elderly people and individuals with co-morbidities. With the problem of the emergence of pathogenic CoVs and the threat of future pandemics, the development of antiviral agents against human CoVs including SARS-CoV-2 is an urgent priority. Whereas vaccination remains a cornerstone in prophylaxis, antivirals would constitute an important element in the global fights against ongoing and potential pandemics. Anti-SARS-CoV-2 drugs will have the advantage over vaccines that their usefulness would be unaffected by mutational changes in the virus,

which means that they can be used against emerging strains before strain-specific vaccines are formulated. Moreover, their protective action will be immediate, and they will be effective against already established illnesses. In prophylaxis, they will protect against infection, reduce the spread of virus, and serve as a useful supplement to immunization.

With the ongoing COVID-19 pandemic, several attempts are being made to repurposing many existing antivirals against SARS-CoV-2. However, the drugs targeting the virus-encoded proteins have a disadvantage due to emergence of resistance through mutations in the SARS-CoV-2 genes. The possible generation of resistant strains remains a concern. To address this issue, a novel therapeutic strategy can be devised in which, instead of focusing on SARS-CoV-2 itself and its proteins as targets, new anti-SARS-CoV-2 drugs can be developed that will interfere with host cell factors, essential for establishing infection. By blocking the activity of these proteins, it will be possible to inhibit the replication and production of progeny viruses. It is already evident from several studies that many of the host proteins needed for viral entry and infection are enzymes or other proteins against which inhibitors may already be available or relatively easy to develop. Using such host-directed inhibitors, viruses are unlikely to develop resistance as they are not likely to change the entire design of the SARS-CoV-2 entry and infection process.

Recent studies identified ACE2 as the host cell receptor for SARS-CoV-2, which the virus binds to via the receptor-biding domain (RBD) of its spike glycoprotein (S). The virus is also dependent on S protein-processing factors such as TMPRSS2, cathepsins, furins, etc., which are present in the host cell. Additionally, several entry cofactors for SARS-CoV-2 such as NRP-1, HSPGs, PS, CD147, C-type lectins have been identified. Genome-wide RNAi and CRISPR/Cas9 screens have also identified hundreds of cellular factors that are essential for SARS-CoV-2 entry and replication. Identification of these molecules opens up a new avenue in developing therapies against SARS-CoV-2 in which, existing inhibitors against them can be tested and new inhibitors can be designed to block their activity, which may eventually suppress SARS-CoV-2 infection in the hosts.

How about potential toxic side effects of the host-directed drugs? Will it be possible to inhibit cellular factors without affecting critical cell functions? Increasing body of data indicates that it is indeed possible to inhibit or eliminate many cell functions without serious side effects to the cells and the organism. The reason is the 'robustness' built into cellular networks through redundancy and complexity; targeted interference with individual activities does not necessarily lead to adverse side effects. A paradigm for this is the use of Imatinib mesylate (Gleevec) in the treatment of chronic myelogenic leukemia, where the side effects of this tyrosine kinase inhibitor are negligible. The main advantage of the host-directed antivirals will be to interfere with SARS-CoV-2 entry and

production and thus will allow slowing down infection so that the immune system of the patient would have time to respond. The antivirals can be used to protect the high-risk groups (hospital units, institutes caring for the elderly, individuals with comorbidities and who are immune-suppressed), and on a case-by-case basis. A major potential use for host-directed, anti-SARS-CoV-2 agents will be to limit the spread and severity of the future pandemics, caused by emerging strains of human CoVs.

Challenges to a COVID-19 free future generation

Dr. Soma Chattopadhyay, Ph.D.

Scientist F,
Institute of Life Sciences, Bhubaneswar, Odisha

Since the appearance of a patient with severe flu-like symptoms in the Wuhan province of China in late December in the year 2019, the world is fighting a pandemic, which seems to entangle us more and more. The curious case of the causal virus named SARS CoV2 (named by the International Committee on Taxonomy of Viruses (ICTV) has baffled scientists worldwide. The WHO termed the disease as coronavirus disease-2019 (COVID-19) on February 11, 2020. This virus belongs to the order *Nidovirales*, family *Coronaviridae* and genus beta-coronavirus of *Coronavirinae* subfamily. It has been hypothesized that it has been transmitted from bat through an intermediate host by direct contact and finally into humans, which is still not confirmed. Further, human-to-human transmission has been through droplet and direct contact. Its intriguing structure comprises of four structural proteins, and sixteen non-structural proteins. The structural proteins are i.e., spike protein (S), nucleocapsid protein (N), membrane protein (M), and envelope protein (E). The non-structural proteins range from nsp1-16. It has two open reading frames (ORFs), ORF1a and ORF1b. Further, it also contains six accessory proteins, encoded by ORF3a, ORF6, ORF7a, ORF7b, and ORF8 genes. The first whole genome

sequence was published on January 5, 2020. Since then, innumerable genomes have been identified and sequenced. There have been many reported mutations continuing. The recent one the Delta strain, also known by the scientific name B.1.617, (first identified in Maharashtra, India, in October 2020) has been of much concern for the healthcare system as it has caused the mortality rate to go high.

This virus is very infective because it has an RO scale of around 2 to 2.5 so, it is important that the strategy of "Prevention is better than cure" is applied to slow down the spread by stimulating herd immunity and ultimately break the chain. Therefore, wearing masks and practicing social distancing have to be followed efficiently along with the intensive research work for drugs and vaccines to combat its spread. The major issues being faced now are the surge in opportunistic secondary fungal and bacterial infections and post COVID complications (pulmonary, neurological and myocardial, etc.) which have added to the burden and confusion of the health sector. It is recommended to take proper rest, consume a healthy diet, do breathing exercises and maintain personal hygiene post-COVID recovery. In addition, it has been suggested not to do heavy exercises, to avoid consumption of alcohol and smoking as it might aggravate one's health grievances. The current situation can only be overcome by mass vaccination drive along with public awareness regarding wearing masks and practicing social distancing. This recent second wave puts pressure on the scientific community to undertake more research for an in-depth understanding of the virus to prepare us for any forthcoming challenges.

An integrated approach towards delineating determinants of viral pathology and disease progression of SARS-CoV-2 infection

Vainav Patel, Ph.D.

Head, Dept of Biochemistry & Virology,
National Institute for Research in Reproductive Health (ICMR), Mumbai, Maharashtra

The Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic continues to pose a global health crisis despite ongoing interventions such as vaccination. Adhering to prudent behavioral paradigms together with accelerated vaccine delivery is KEY to successfully navigating impending 'waves' of infection. In addition, pathology of COVID-19 displays varied clinical manifestations ranging from no symptoms to critical systemic disease (JAMA 2020; 324(8):782–793) Hypoxemia is a key signature that discriminates between mild and moderate to severe disease (N. Engl. J. Med. 2020;383: 1757-1766). The role of lymphopenia as a defining cellular immune correlate of moderate to severe disease has been well established (J. Intensive Care 2020; 8:36). Underlying immune homeostatic mechanisms that might contribute to this phenotype remain largely unexplored (Science 2020; 369 (6508):1210–1220.). Understanding and identifying such relationships, in the context of vaccination history, would help to guide therapeutic efforts and to ensure optimal disease management of

COVID-19. Here, we evaluated the contribution of key inflammatory, cellular homeostatic, and mucosal migratory markers in distinct stages of COVID-19 pathogenesis.

When expressed as a novel integrated marker –sMIL index (sMAdCAM/IL-6 ratio), these levels were incrementally and significantly higher in various disease states with convalescents exhibiting the highest values. Importantly, sMAdCAM levels as well as sMIL index (fold change) correlated with peak association rates of the receptor-binding domain and fold change in binding to spike respectively as measured by SPR. These results highlight key systemic and gut-associated parameters that need to be monitored and investigated further to optimally guide therapeutic and prophylactic interventions for COVID-19.

IL-6 and sMAdCAM levels among COVID-19 patients inversely correlated with one another and both markers showed converse associations with observed lymphodepletion suggesting opposing roles in pathogenesis. Distinct depletion profiles, with relative sparing of CD8 effector memory and CD4+ regulatory T cells, were observed in hypoxemic disease within the lymphocyte compartment. An apparent increase in the frequency of intermediate monocytes characterized both mild as well as hypoxemic disease. IL-15, a key cytokine involved in lymphocyte activation and homeostasis, was detected in symptomatic individuals but not in healthy controls or asymptomatic cases. The negative association of plasma IL-15 with depleted T, B, and NK subsets suggested a compensatory production of this cytokine in response to the profound lymphopenia. Higher levels of plasma IL-15 and IL-6, but not sMAdCAM, were associated with a longer duration of hospitalization.

Ongoing scientific research and development of indigenous diagnostics at National Institute of Virology

Dr. Priya Abraham, MD, FRCP, FRC Path, PhD
Director, ICMR- National Institute of Virology, Pune

COVID- 19 cases were confirmed in India in March 2020. Right from January 2020, physician-scientists of NIV began gearing up for medical response against pneumonia cases of unknown etiology that were being reported at Wuhan, China. Scientists at the National Institute of virology also started working on molecular tests for the detection of viruses at the National Influenza Centre (NIC). Conventional one-step reverse transcriptase (RT) PCR assays were standardized by 15 January 2020 and assay reagents with SOPS were sent to 13 Viral Research Diagnostic Laboratories (VRDLs) which were close to airports. In-house positive controls or in vitro transcripts were made by 16th February 2020 and were rolled to several more VRDLs. As of today, 107 VRDLs are empowered with these assays and controls and over 1200 government labs followed the protocols sent by NIV in the initial stage of the pandemic.

NIV also participated in WHO Global External Quality Assurance System (EQAS) Panel for detecting SARS- CoV-2 and scored 100%, which further assured the quality of its RT-PCR tests. Characterisation of SARS- CoV-2 virus at NIV showed only 99.98%

identity to the virus from the Wuhan strain. The SARS- CoV-2 virus was first isolated in India in the Vero CCL-81 cell line from nasal and throat swabs. Immunofluorescence, Transmission electron microscope imaging, and whole genome sequencing further confirmed the virus. India thus became the fifth country in the world to be successful in isolating the virus.

Isolation and the ability to propagate the virus helped in the production of a large amount of antigen thus aiding in the development of indigenous ELISA using gamma inactivated whole virus antigen. This detected human IgG antibodies in human sera. This kit is used in most laboratory settings across the country including public health centres and hospitals. Another important assay that was standardized is the neutralization assay. The technology of indigenous ELISA developed at NIV was further transferred to seven companies. Further neutralization studies showed that convalescent plasma is not associated with a reduction in progression to severe COVID-19.

Several companies also approached NIV to make hyperactive immune immunoglobin using horses. Inactivated viral antigens in multiple doses were injected into horses and the serum samples were taken to detect antibody titre. Greater than one million titres of antibodies were obtained by this method. Single tube assay for molecular diagnosis was developed by June 2020. Fecal shedding of the virus in a family cluster was also studied in which 42.4% of individuals were positive by RT-PCR. This shows that the virus can remain viable in stools for a longer time. Antiviral compounds including plant alkaloids were tested and about 100 compounds were screened out of which 21 compounds showed promising antiviral activity. Equipments like ozone-based decontamination systems, ion generators were also tested for their efficacy in the decontamination of SARS-CoV-2.

Vaccination studies started along with Bharat Biotech Ltd. Studies went from exploratory stage to preclinical stage involving the use of hamsters and Rhesus Macaques to clinical trial (phase I & II). BBIL started their started doing safety and immunogenicity in small animal models (Rats, rabbits, mice). Then hamster challenge was done at ICMR-NIV using a 3-dose vaccine regime in which binding and neutralization antibody

response was observed. Then Non-Human primates were used for a study involving the use of a two-dose vaccination regimen which was capable of inducing high levels of neutralizing and binding antibodies. Genome characterization of Sars-CoV-2 was studied amongst which pangolin lineages are quite popular by the end of the year two major lineages were observed. G- clade was predominant. More heterogeneity of lineages was observed in western Maharashtra. B.1.617 was predominating and mostly responsible for community outbreaks.

ICMR-NIV contributed to COVID-19 studies like the establishment of COVID-19 screening, molecular Testing, whole-genome sequencing, molecular characterization, electron microscopy, virus isolation, ELISA development, neutralization assays, development of animal models, establishment of antiviral assays, antiviral testing, Equine antiserum, PLACID & PLATINA trials, Vaccine studies, Immunological Studies, Establishment of bio-repositories, Kit Validations, Depot for Reagent supply, QA/QC for Gov./Pvt. Lab.

ACE-2 Binding region of RBD of Spike protein of SARS-CoV extending from position 437-508 was studied. The alpha variant or B.1.617 variant was having additional hydrogen bonds, which pointed to the chance of increased transmissibility, which has also been observed clinically. Also binding of certain candidate monoclonal antibodies were investigated. Results of which were indicative that mutations in variants can reduce the intensity of binding of the antibody. Neutralization of variant B.1.617 with sera of BBV152 (COVAXIN) was checked. In addition, comparison studies of neutralization titres between B.1 & B.1.617 were done. With natural infection and vaccination, the titres were observed to be high.

Participant's Abstract

Probiotic aids immune: Prebiotic aids probiotics

Ms. Naina Bhanjer, Dr. Sejal Rathod, Ms. Prachi Bhatia

Department Of Biotechnology, Kishinchand Chellaram College
Vidyasagar Principal K.M. Kundnani Chowk, 124, Dinshaw Vacha Rd, Churchgate,
Mumbai 400020, Maharashtra, India

Prebiotics are compounds in food that induce the growth or activity of beneficial microorganisms. The most common example is in the gastrointestinal tract, where prebiotics alters the composition of organisms in the gut microbiome. Prebiotics are the fibres or carbohydrates that the human body cannot digest, but gut bacteria can digest them, prebiotics acts like food to help healthy bacteria grow. In covid, the immune system plays the key role mainly with white blood cells, by which foreign bodies are inhibited. For new antiviral drug development, it will take considerable time and effort. Therefore, repurposing natural compounds may be the alternative. Probiotics can regulate both innate and adaptive immune systems and enhance phagocytic activity, leucocytes, expression of some receptors that are associated with phagocytosis, and increases the microbicidal function of neutrophils. *L.casei strains, Shirota (LcS)* in previous studies have shown that can prevent and treat the microbial infections in the gastrointestinal and respiratory tract with influenza, duration, and occurrence of flu and respiratory tract infections. This study centres on the evaluation of prebiotic properties for natural, aqueous extracts of Aloe vera *(Aloe barbadensis miller)*, Kokum dried (*Garcinia indica*), and Wheatgrass (*Triticum aestivum*) by stimulation of growth, of probiotic organism *L. casei* isolated on Man Rogosa Sharpe Agar and was measured colorimetrically at 545nm. Antimicrobial and bio preservative studies were also performed of these extracts. Hence to evaluate the variable properties of being used in cancer treatment, cosmetics, Food industry, viral infections. Presence of Vitamin C in these plants by DCPIP method broadens the idea of Prebiotics applications as better immune health and wound healing. Probiotic organism is also used in horticulture, where it resulted in enhancing the process of germination; *L. casei* of 10^8 cfu/ml was incorporated in the soil to enhance germination of fenugreek seed and kokum extract as a prebiotic source. Therefore, immune is enhanced by consuming probiotics, which is enhanced further due to prebiotics.

Keywords: Prebiotic, *L. casei*, Colorimetrically, Biopreservative, Germination.

Awareness and Research Challenges- Roadblocks for a COVID-free Era

Ms. Nilakshi Patel, Ms. Sancheti Chougale, Mr. Nissey Sunil, Ruqayya Manasawala

Department Of Biotechnology, Jai Hind College
A Rd, Churchgate, Mumbai 400020, Maharashtra, India

The ongoing pandemic caused by the novel strain of beta coronavirus, SARS-CoV-2, has afflicted millions of people in countless dimensions. Scientists across the globe started working on the strain initially by studying its structure, detailed mechanisms, virulence factors, and transmission. During the first wave of COVID-19 in 2020, the only approach to stop the chain of transmission was preventive measures. By the year 2021, an unprecedented pace of work among the scientific community led to the development of effective vaccines to release the world from the grip of this pandemic. This rush, however, made a vast majority of citizens question the efficacy and safety of the vaccines generating reluctant volunteers for participating in the nationwide vaccination drive. Along with designing vaccines and drugs with sufficient safety, efficiency, and efficacy such that it gains trust and confidence from the citizens, creating awareness level among people at the right time to gain their cooperation, laying and following the stringent protocols, healthcare-associated infections, mutations, and evolution, designing efficient diagnostic kits, lack of sufficient supplies and financial crisis are several more dimensions which contribute in creating hindrances for an infection-free future. In this study, we compare people's awareness and perception towards vaccines and their precautionary levels via surveys, which were conducted before and after the second wave of COVID-19 struck the nation. The survey brings out the contribution of the public in disease transmission. The objective of this research is to prove some of the challenges for an infection-free future using the data obtained during the ongoing pandemic.

Keywords: COVID-19, pandemic, vaccines, challenges, awareness, survey

Rapid spread of COVID-19 in Mumbai Metropolitan region

Ms. Deepa Ravi Hirani

Department OF Microbiology, Elphinstone College, Dr. Homi Bhabha State University
156, Mahatma Gandhi Road, Mantralaya, Fort, Mumbai 400023, Maharashtra, India

In early December 2019, an outbreak of coronavirus disease 2019(COVID-19), caused by a novel severe acute respiratory syndrome coronavirus (SARS-CoV-2), occurred in Wuhan City, Hubei Province, China. As of 11 February 2020, data from the World Health Organization (WHO) have shown that more than 43,000 confirmed cases have been identified in 28 countries/regions, with > 99% of cases being detected in China. On January 30, 2020, the World Health Organization declared the outbreak as a Public Health Emergency of International Concern. The perceived risk of acquiring disease has led many governments to institute a variety of control measures. A literature review of publicly available information to summarize knowledge about the pathogen and the current pandemic was done. In this literature review, the causative agent, epidemiology, rapid spread, challenges faced in prevention of community transmission and management of the disease, control, and prevention strategies are all reviewed in the city of Mumbai.

Keywords: pandemic, WHO, community transmission, control, prevention strategies

Challenges to an Infection-Free Future Generation

Ms. Aditee Dandekar, Ms. Bhavishya Venugopal, Ms. Himrekha Agarwal, Mr. Nyle Gaikwad, Ms. Sneha Pednekar

Department of Biochemistry, Ramnarain Ruia Autonomous College
L. Nappo Road, Dadar East, Matunga, Mumbai 400019, Maharashtra, India

The world has witnessed a plethora of deadly infections like Bubonic plague, Smallpox, and the most recent being Covid-19 which escalated into becoming a pandemic in a very short period. According to the World Health Organization, the death toll due to Covid-19 could be at least 6-8 million now. Thus, the focus to control infection has increased exponentially which will help humankind to curb any future infections. An online survey was conducted in June 2021 to understand the general opinions, knowledge, and awareness among the people, which also included preventative measures followed. The 300 participants from Maharashtra were stratified by age, gender, and occupation. The results obtained helped us to study the challenges faced in this Covid-19 pandemic, which were addressed to give suggestions for an infection-free future generation. After analysis of the data, scores of participants (61.2%) asserted that the main reason for this pandemic was the failure to follow the guidelines by the masses. After almost 1 ½ years of lockdown, it is perceived that 25.4% of people are unassertive about the effectiveness of the same. Among the participants, only a small percentage (19.3%) of the people specifically from the 45 and above age group were fully vaccinated. From this survey, it can be understood that the essential factors which stand as challenges to an infection-free future generation are limited cognizance among the general population about any type of infection (in this case Covid-19); inadequately designed vaccination programs; lack of fluent coordination between the authorities, public health system and the general population; and hesitance of society to take responsibility. Further empirical inquiry would provide a deeper insight about the challenges for an infection-free future generation.

Keywords- Awareness, Challenges, Infection, Precautions, Vaccination

Probiotics, an Immunity Booster and Prebiotics, a Probiotic Enhancer: A survey regarding Awareness about intestinal health and immunity

Ms. Sanskruti Rane, Ms. Naina Bhanjer, Dr. Sejal Rathod

Department of Microbiology, Kishinchand Chellaram College
Vidyasagar Principal K.M. Kundnani Chowk, 124, Dinshaw Vacha Rd, Churchgate, Mumbai 400020, Maharashtra, India.

Probiotics are live microorganisms that exhibit properties beneficial to health when consumed. They are also commonly found as gut microflora, which helps digest food and improve its absorption. This microflora also plays a role in maintaining intestinal immunity as it prevents colonization of other harmful pathogens. Prebiotics are the food source for this microflora. They are certain dietary fibres and carbohydrates that the usual gastric juices are unable to digest but they are easily digestible by the probiotic organisms. Ayurveda states the significance of good intestinal health, as majorly diseases arise due to misbalance or any sort of infection in the intestine. Immunity was a key element in this Covid situation. Individuals with co-morbidity were at more risk. Maintaining good intestinal health is important to gain immune strength. Gut microbiota alterations were one of the factors, which increased the chances of acquiring an infection. Consumption of products like curd and certain dairy products are emphasized in our ethnic culture, as it has lactic acid bacteria. The pivotal role of dietary fibres, which are derived from many traditionally, consumed foods, fruits and spices are well studied and known. Consuming Probiotics leads to good intestinal health ultimately resulting in better immune power. The study aimed to survey the awareness of the importance and application of Probiotics. The study statistically proved that the sample of individuals examined was quite aware of the consumption of Probiotics. Even the consumption of Prebiotics was observed amongst the sample individuals. The survey also consisted of questions regarding the benefits and applications of Probiotics and Prebiotics respectively. The awareness regarding immunity and the way a good intestine helps us in experiencing a healthy life results in healthy eating habits.

Keywords: Probiotics, prebiotics, intestine, immunity, awareness

Emergence of Nanomaterials in treatment and diagnosis of Lung diseases

Ms. Anita. H. Yadav, Ms. Shailaja .P. Palan

Department of Biotechnology, Sonopant Dandekar College
College Road, Tembhode, Palghar 401404, Maharashtra, India.

Respiratory diseases like Lung cancer, Tuberculosis, Asthma, and COVID-19 pose a severe threat to life of humans. Some of them have been treated using several drugs and vaccines. With emergence of Nanotechnology and the use of Nanoparticles such as liposomes, exosomes, metal oxide nano polymers, dendrimers, micelles have slowly found their foothold in developing an efficient drug delivery system and diagnosis in respiratory disorders. This review article emphasizes on applications of Nanoparticles in delivering the drug, in targeting vaccines to specific cell lines, and in diagnosing various lung diseases. Many Research papers showed that certain Nanoparticles alone could also provide an antimicrobial response. Not only this, but its application also extends as implants and for diagnosing life-threatening diseases such as Cancer, COVID-19 in their early phase, through some advanced techniques like Nanophotonics and Nanotheranostics. Nanorobots such as respirocytes are one of the emerging technology can play a promising role in upcoming years which is more rapid, less complicated and more beneficial in treating respiratory-related diseases. Thus, the application of nanoparticles, which has been ascertained of no adverse long-term effect, can prove a beneficial tool in diagnosing and treating not just existing but even emerging respiratory disorders.

Keywords: *Nanoparticles, Nanomedicines, Nanotheranostics, Lung diseases, Nanorobots, Biosensors*

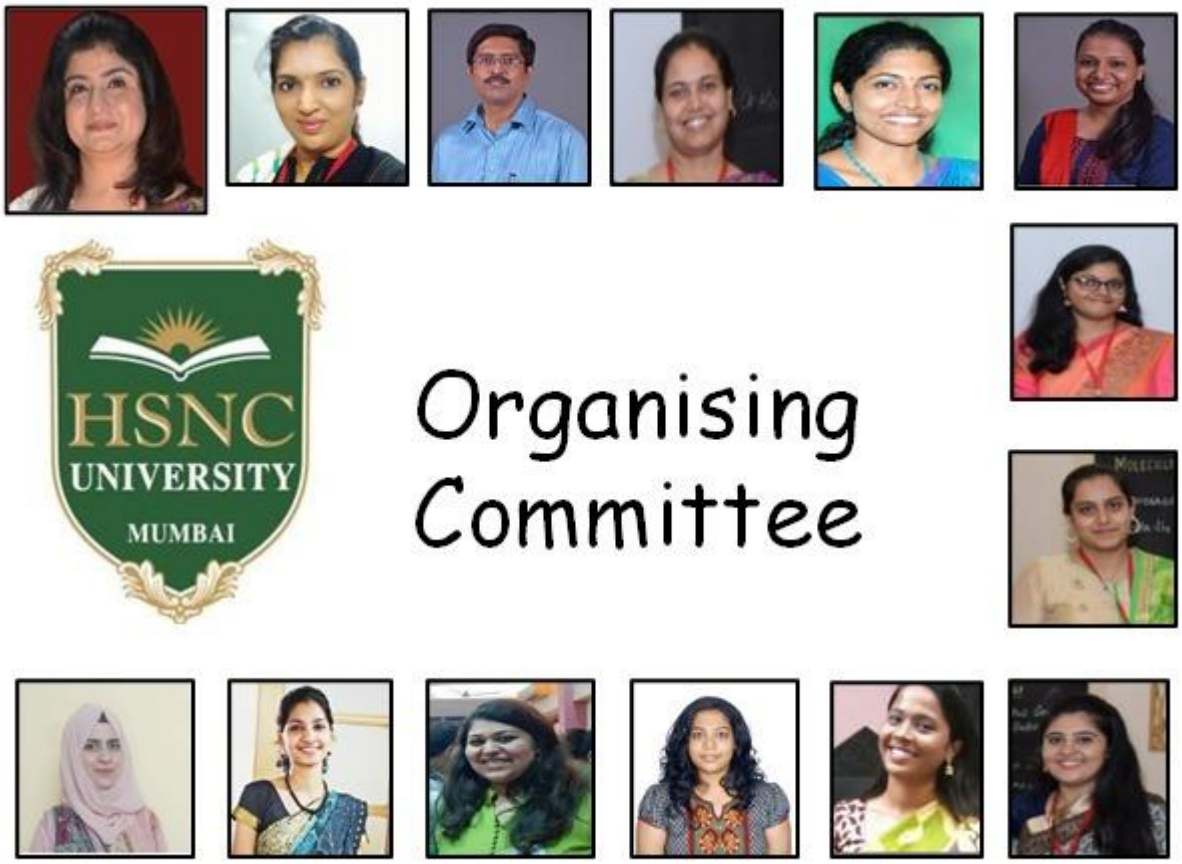
Study on Usage of Face Masks and Gloves in the COVID – 19 Pandemic

Mr. Chirag Chinta, Mr. Ganesh Chintakindi, Mr. Anurag, Dr. Pratibha Shah

Department of Microbiology & Chemistry, Kishinchand Chellaram College Vidyasagar Principal K.M. Kundnani Chowk, 124, Dinshaw Vacha Rd, Churchgate, Mumbai 400020, Maharashtra, India.

The current study is designed to collate information on pattern of usage of protective equipment in the COVID – 19 pandemic. The study highlights protective measures adopted for COVID – 19 by the test population and evaluates the challenges faced with respect to the usage of facemasks, gloves. An online survey was conducted using Google Forms, which was disseminated using social media platforms, and the data obtained were analysed using Jamovi [version 6.1]. The demography profile of 339 respondents was recorded and 62% of the test population comprised of students of age group 18 – 23 years. The survey highlighted the type of protective equipment used by people frequently and it was found that 48% of the respondents used only masks and 42% used both masks and gloves. Homemade masks were used by (33.92%); plastic gloves by (53.4%) of the population. 81% of the population reused masks after washing, and 72% discarded the gloves after a single-use. Scale analysis was used to evaluate the experience of mask usage based on the factors like comfort, breathability, and expense. Females expressed marginally more displeasure towards comfort and breathability as compared to males, but the difference was statistically proved to be insignificant (P = 0.411). In the survey, certain questions were directed exclusively to healthcare professionals and their response suggested that a mask could be used for 6 – 10 hours and gloves for 4 – 6 hours without irritation. Awareness about antimicrobial coating, which is a process of applying antimicrobial agents such as biocides or silver nanoparticles on protective equipment was analysed in the current study. 55% (186/339) of the respondents were aware of antimicrobial coatings on masks and gloves and 52% wanted to use them. Thus, the survey propelled the idea of testing the efficacy of antimicrobial coatings in our study further.

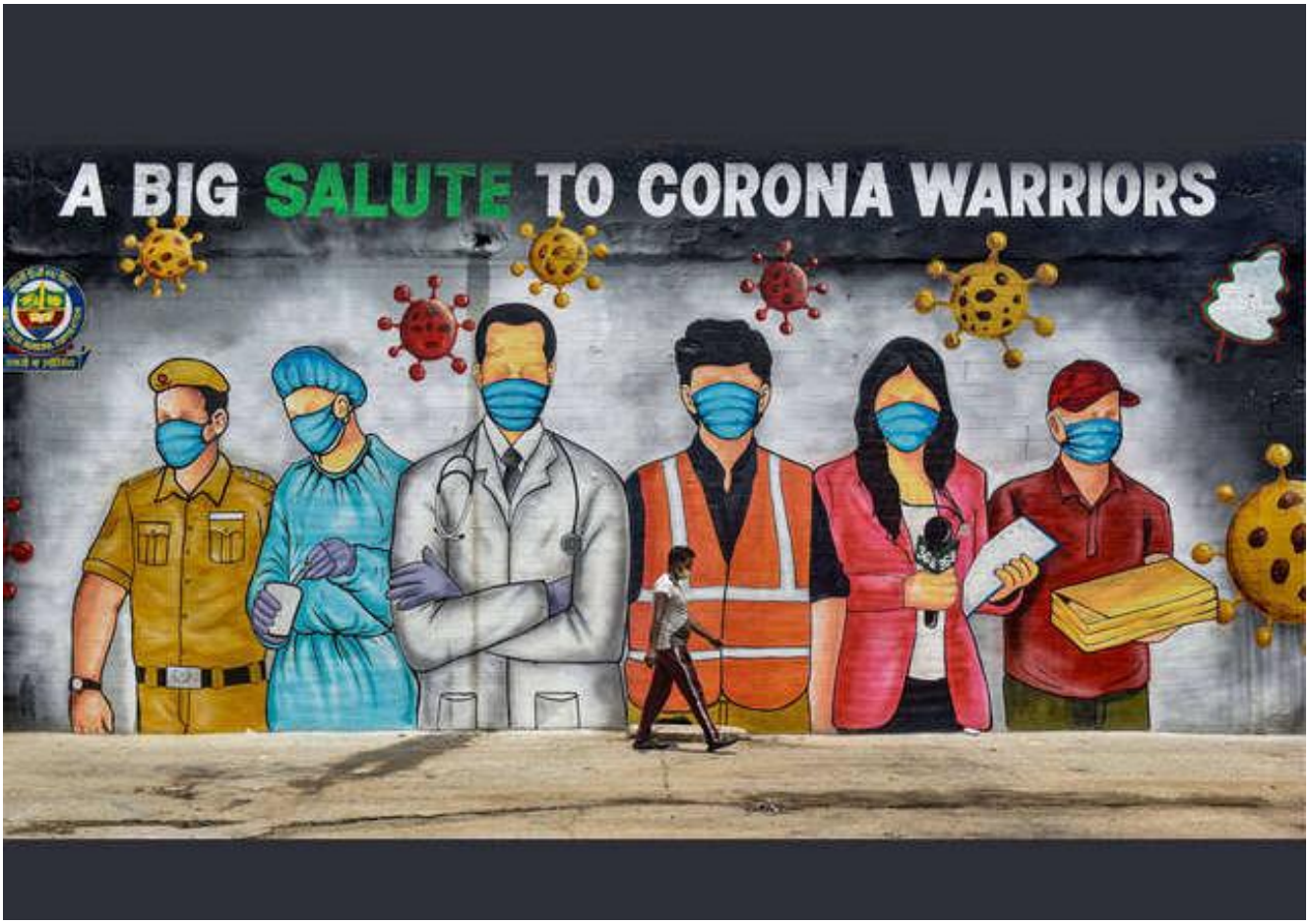
Keywords – Covid-19, Masks and Gloves, Scale analysis, Silver Nanoparticles



- **Convener - Dr. Sejal Rathod,** Head, Dept. of Microbiology & Biotechnology, K. C. College
- **Co-Convener - Dr. Pratibha Shah,** Asst. Professor, Dept. of Microbiology, K. C. College
- **Organizing Secretary - Ms. Rajitha Satish,** Asst. Professor, Dept. of Microbiology, K. C. College
- **Co-ordinator- Dr. Karun Sodah,** Asst. Professor, Dept. of Chemistry, K. C. College

Organizing Committee Members

- **Mrs. Amina Dholkawala,** Asst. Professor, Dept. of Microbiology, K. C. College
- **Ms. Priyanka Yadav,** Asst. Professor, Dept. of Microbiology, K. C. College
- **Mrs. Hajra Gupta**, Asst. Professor, Dept. of Biotechnology, K. C. College
- **Ms. Prachi Bhatia, Asst.** Professor, Dept. of Biotechnology K. C. College
- **Ms. Neha Manoti,** Asst. Professor, Dept. of Biotechnology, K. C. College
- **Ms. Chinmayee Mahadik,** Asst. Professor, Dept. of Biotechnology, K. C. College
- **Ms. Rashmi Patil, Asst.** Professor, Dept. of Biotechnology, K. C. College
- **Mrs. Aswati Nair,** Asst. Professor, Dept. of Microbiology, K. C. College
- **Ms. Tohra Chapra,** Asst. Professor, Dept. of Microbiology, K. C. College


A BIG SALUTE TO CORONA WARRIORS