



TECHNOLOGY IN THE FIGHT AGAINST COVID 19: INDIAN PERSPECTIVE

Community Medicine

**Dr. Mongjam
Meghachandra
Singh**

Director Professor, Department of Community Medicine, Maulana Azad Medical College, New Delhi-110002

Dr. Reeta Devi*

Assistant Professor (Sr.scale), School of Health Sciences, Indira Gandhi National Open University, Maidan Garhi, New Delhi 110068 *Corresponding Author

ABSTRACT

Technological advances have been contributing towards prevention and control of COVID-19 pandemic globally. India has also taken a proactive role in engaging technology in the fight against this pandemic besides a strong political will, with the imposition of lockdown measures. Some of these measures include use of artificial intelligence, Aarogya setu app, drones, sanitizing tunnels, robots in patient care, testing, drugs, vaccine, plasma therapy, portable contactless swab collection etc. This article describes the role of these technologies in Indian context.

KEYWORDS

Technology, robots, artificial intelligence, drones

INTRODUCTION

Ever since a medical student arriving at the end of January 2020 from Wuhan, China was the first Indian to test COVID-19 positive, Indian Government took a slew of measures to contain the disease. The available infrastructure in India is far from satisfactory as compared to developed countries. In the initial days of January 2020, India had 0.5 beds per 1000 as compared to 3.2 in Italy, 4.3 in China. There were nearly 40000 ventilators, lack of testing kits, shortage of personal protective equipments (PPE) and oxygen flow masks. The grim scenario foretold India to prepare swiftly to fight the deadly pandemic.⁽¹⁾

In case of Kerala, the actions taken included screening of passengers in international airports, extensive contact tracing using the mobile numbers of the persons arriving from abroad with Geographical Positioning System (GPS), isolation, surveillance, lockdown, shutting schools, banning large gatherings both in public and religious places, public awareness on COVID-19, using social media rationally, creating call centre with a hotline number for queries, separate mental health help line, providing free meals for school children. setting up of community kitchen scheme to feed the public and free provision of rice, oil and spices. Besides these, the state boosted capacity for internet users for provision of work at home, stepped capacity for production of hand sanitizers and face masks. Many of these were later incorporated in India as components of COVID-19 prevention and control activities when Prime Minister declared lockdown in the country on 24th March 2020.⁽¹⁾

Government of India has fully geared to combat COVID-19 pandemic. Prime Minister himself was involved in making plans, implementing stringent measures such as lockdown, creating awareness about the infection to the public, supporting infrastructure for availability of essential items including masks and personal protective equipments (PPE), drugs, ventilators, hospitals, isolation, quarantine facilities, research and development for vaccines, testing kits, co ordinating activities with various ministries, releasing funds for economic upliftment etc. in consultation with various expert groups.

Union cabinet, on 22nd April 2020, approved promulgation of an ordinance to amend the Epidemic Diseases Act, 1897 making violence against doctors and frontline health personnel a cognizable and non-bailable offence. Violation of the law will attract a jail term from 6 months up to seven years and a fine of upto Rs.5 lakhs.⁽²⁾

METHODS

Articles were searched by google search engine, google scholar, in pubmed using the terms: technology in COVID-19 care, artificial intelligence, control measures of COVID-19 in India. The search included articles in journals, newspapers, blogs, television, and announcements of government. The related articles were narrowed down to the related sub categories of technology such as testing, screening, swab collection, artificial intelligence, drone, aarogya setu

app, sanitizing tunnels, drugs, plasma therapy, and vaccines.

OBSERVATION

Technology is emerging as a major tool in the combat against COVID-19 pandemic. Governments, academic institutions, industries, incubators, startups, small or large businesses have contributed in developing new innovative solutions in controlling the pandemic. Ministry of Corporate Affairs (MCA), Government of India has allowed companies to initiate innovative technologies to fight against the novel coronavirus.

The United States (US) has enacted Emergency Use Authorization (EUA) allowing Food and Drug Administration (FDA) to expedite the use of new medical devices during public health emergencies like COVID-19 pandemic. Companies can manufacture medical devices and market them at a rapid pace.

Several companies like Sequoia Capital, Accel, Matrix Partners, Kalaari Capital set up a corpus fund of Rs.100 crore to support startups to develop innovative products and services to fight against the coronavirus.

Ventilators are in shortage due to increasing number of COVID-19 cases. AgVa Healthcare, Indian startup has ventured to produce a cost-effective 20000 ventilators. An Italian startup, Isinnova designed 3D-printed valve that turns snorkeling masks into ventilators.

Other companies such as Apple, Center for Disease Control (CDC) and startups such as CarbonHealth, Babyscripts are using technology to spread authentic information on COVID-19 and its prevention to the people.⁽³⁾

ROLE OF ARTIFICIAL INTELLIGENCE (AI)

Artificial intelligence is the quest to build machines that can reason, learn, and act intelligently.

Researchers are increasingly using AI in the prevention, control and treatment of COVID-19. AI based systems are reducing the strain on health care providers, accelerate diagnostic and reporting systems. Some of the uses of AI are: (1) to find drugs that target the novel coronavirus by studying the molecular set up of existing drugs. The system suggested a number of compounds such as Baricitinib used in rheumatoid arthritis. (2) Understanding structure of SARS CoV-2 virus. DeepMind used data on genomes to predict the protein structure of the coronavirus giving information on potential drugs which can work against it. (3) Detection of outbreak and spread of new diseases. AI is considered to be the first to detect COVID-19 outbreak while limited to Wuhan, China. AI driven HealthMap, in Boston picked up growing clusters of unexplained pneumonia before human researchers. (4) Detection of signs of COVID-19 in X-rays. DarwinAI, Canadian startup developed neural network to screen X-rays for signs of COVID-19. Researchers from Indonesia, Turkey and India are

working on the use of AI in COVID-19. (5) Monitoring mental health status of the people affected by COVID-19. Researchers are using twitter, chats and social media to assess the mental health problems of the people due to the pandemic. (6) Forecasting spread of COVID-19 and deaths. Google owned machine learning community Kaggle has worked on models based on dataset of infections in 163 countries from the past few months to predict factors and spread of the infection. (7) Prediction of severe cases of COVID-19 using models. (8) Thermal scanners with infra-red sensors for detecting persons having fever or high temperature. This has been installed in airports, ports, malls and other public places to identify persons with high temperature for detection of COVID-19. (9) Use in apps for identification and alerting people for social distancing such as Aarogya Setu app promoted by Government of India.

Artificial Intelligence based X-ray system called qXR, from a Mumbai based company Qure.ai, is used in Royal Bolton Hospital, UK to read the chest X-rays without a doctor. It is then verified by a radiologist at a later stage and observed that severe cases of COVID-19 displayed distinct lung abnormalities. qXR performed initial chest X-ray readings at a fast and affordable rate.

In qXR system, a panel of experts reviewed literature to find out the typical features of COVID-19 induced pneumonia e.g. opaque patches with ground glass pattern, dense regions on both sides of the lungs. The findings are encoded into qXR. It calculates risk of infection based on the X-ray findings. Validation study over 11000 images reported that the tool had 95% accuracy in distinguishing between COVID and non-COVID patients. The tools need evaluation with hard evidence before considering use of AI for standard of care.

Vizyon used Lunit's software and takes only 10 minutes to scan a patient and calculate infection probability. Results were comparable to human radiologist in risk analysis. Lunit's lung screening products have been certified by European Union's health and safety agency.⁽⁵⁾

AAROGYASETU APP

It is impossible for anyone to track encounters with people suspected of harbouring novel coronavirus or Covid-19 asymptomatics at common places like banks, market, garden etc. China and South Korea have demonstrated the efficacy of 'smart' contact-tracing. Aarogya Setu, a digital app by the Government of India, available on Google playstore keeps track of all other phones it comes in contact with, via bluetooth. It is India app for contact tracing.⁽⁶⁾

Each phone transmits a unique code and saves the codes of other phones when it comes within the range for several minutes at a time. If any contact is covid-19 positive, this app will alert the phone holder, provides information about self-quarantining and getting tested.

Limitations of the app

There were 6 crore downloads in first 17 days and might not be to cover all 130 crore Indians due to lack of testing and low penetration of smartphones. Researchers opine that to be effective, it should be used by at least 50% population or 60%. In 2019, less than 30% Indians owned smartphones. Even if 100% smartphone owners install the app, it might not be effective specially in small towns and villages.⁽⁶⁾

Smart phone contact tracing is based on self-reporting. If someone has fever, cough, breathing difficulty and he reports it through app then only it will alert the contacts about his risky status. Moreover, 69% corona positive people in India are asymptomatic but not detected without testing, his phone will broadcast "risk-free" since he has not updated his status in the app.

Similarly, if someone is symptomatic but does not update and hide his status to avoid being quarantine due to fear, anxiety, his status will again be "risk-free" though he can spread the infection.

Over anxious people reporting symptoms out of fear in the app, will give false alarm to his contacts despite his non-infectious status. This will lead to self-isolation of contacts leading to increased workload on the health care delivery system.

Sometimes, automatic contact tracing may not be possible. The system works if phone constantly broadcasts codes. If someone has downloaded the app but has not granted the necessary permissions, contact tracing is not possible.

The app may generate false positive alarm and alerts due to bluetooth leakage in the walls. If someone is positive and staying below or above floor without his contact, it might be troublesome for the phone holder. Sometimes, bluetooth might not be able to send messages due to weak signals, if kept inside bags and the phone holder is in a noisy surrounding like market place, bus stops, or other public places. The app will recommend a person to isolate even if the person has maintained social distancing norms, and both him and his positive contact wears masks.

Privacy issues

Aarogya setu app uses GPS in addition to bluetooth and tracks every movement of the phone holder. It can reveal one's identity, his secret associateship such as extramarital affairs etc. thereby courting controversies with intrusion into privacy issues. If the virus continues to spread for a longer period, there is a fear about covid-19 surveillance through phones.⁽⁶⁾

Facebook used technology to map persons with coronavirus symptoms in US by surveying among one million facebook users. It goes down to county level with daily updates. This data can facilitate policy makers to understand the trend about rising cases, predict hotspots of COVID-19 and preplan the need to reallocate resources such as face masks, personal protective equipments, ventilators in the affected areas. The limitation is due to lack of participation in survey.⁽⁷⁾

AI FOR CHECKING SOCIAL DISTANCING NORMS

A workplace monitoring tool for observance of social distancing has been created by a startup in US using neural network and an algorithm. It can detect breach of social distancing norm of six feet during work. The tool can be integrated into the surveillance or security cameras installed in the workplace. This enables managers to rearrange the workspace so that workers are protected from catching coronavirus. Amazon is using similar software to monitor distances between their warehouse staff. Such systems transmit warning signals in real time when behaviours of the people deviate from standard norms. This system should be used with transparency after getting consent from the workers to avoid any misuse.⁽⁸⁾

DISEASES MODELLING FOR SURVEILLANCE

Anastassopoulou C et al used available epidemiological data for Hubei, China from January 11 to February 10, 2020 with Susceptible-Infectious-Recovered-Dead (SIDR) model to provide estimations of the basic reproduction number (R_0), daily infection mortality, recovery rates. This model used to forecast the evolution of the outbreak over the next three weeks. Different scenarios estimated the R_0 to be 2.6 and 2, suggested a slow down of the outbreak in Hubei by end of February 2020.⁽⁹⁾

Wu JT et al used mathematical modelling to forecast domestic and international spread of novel coronavirus.⁽¹⁰⁾ They used data from Dec 31, 2019 to Jan 28, 2020, number of cases exported from Wuhan, both domestic and international, monthly flight bookings, human mobility from Tencent database. They used a susceptible-exposed-infectious-recovered metapopulation model to simulate the epidemics across all major cities in China. R_0 estimated using Markov Chain Monte Carlo methods was 2.68 (95% CI 2.47-2.86).

A website with city and county level COVID-19 model predictions for the Commonwealth was launched at Old Dominion University's Virginia Modelling Analysis and Simulation Centre (VMASC). It used current data sets to forecast for the next week's COVID-19 cases. Findings showed that social distancing was working in Virginia and slowed spread of COVID-19.⁽¹¹⁾

Mathematical modelling can compute a realistic picture of the infection rate of SARS-CoV-2 virus. It includes information on corona virus, underreported cases, population density, age distribution of the population in an area enabling predictions for prevention and control.⁽¹¹⁾

Li Y et al established dynamics model of infectious diseases, time series model to predict trend and short-term prediction of the transmission of novel coronavirus. They predicted cumulative number of confirm cases in Wuhan to peak at 76,982 on 20th March 2020.⁽¹²⁾

Antigen Testing For Faster Detection Of Sars-cov-2

The gold standard for SARS-CoV-2 virus detection is by the use of

polymerase chain reaction (PCR) test. It is time consuming, needs skilled technician, and cannot be used for rapid testing. Rapid test used is based on antibody detection against corona virus. It could be done if a person has crossed 14 days from the appearance of first symptom. It is limited due to variable test results with less reliability.

Alternative tests include antigen detection looking for fragments of viral surface proteins. Its purpose is similar to PCR tests, takes less time and results can be delivered on the spot. It is good at detecting new cases of COVID-19 unlike antibody tests which tests whether a person was previously infected and recovered. A Cambridge based biotech company, E25Bio has developed a covid-19 antigen test. In this, once the nasal sample is taken, it is introduced into a solution, then is exposed to one end of a series of paper strips which contain artificial antibodies. As the solution moves upward on the strip, antigen that are present will bind to antibodies giving a visual readout. It takes less than 30 minutes to get test results, and requires minimal training. The cost of each test is \$10. E25Bio plans to roll out an app that can collect test results from users and make data available for epidemiological surveillance. This test also has limitations. It depends on the presence of the virus and sensitivity could be around 70-80% for a well collected nasal swab. There is no amplification to the genetic material in antigen test and the sensitivity drops as compared to PCR. Antigen tests still needs validation studies and these tests won't replace PCR tests.⁽¹³⁾

RAPID TESTING KITS

A portable kit of the size of a toaster, named Abbott Id NOW KOVID-19, has been developed by Abbott Laboratories. It has received Emergency Use Authorization (EUA) from United States (US). This is a molecular test that can detect fragments of SARS-CoV-2 virus genome. It takes less than 13 minutes for a definitive rule out of the coronavirus infection. The nasal/throat swab is mixed with a chemical solution that breaks the virus releasing its RNA. The mixture is inserted into the box having the kit which identifies and amplifies select sequences of the coronavirus genome from other contaminant viruses.⁽¹⁴⁾

ICMR has approved for the first time a probe-free assay for detection of SARS CoV-2, developed by IIT Delhi using real time PCR. It uses primers specifically bind to regions conserved in over 400 fully sequenced COVID-19 genomes. Validation by National Institute of Virology, Pune has shown that it is 100% sensitive and specific. It costs much less than PCR.^(15,16)

DISINFECTION TUNNELS

Disinfection tunnels are new technological endeavours in the fight against COVID-19. Coronavirus is protected by an envelope made of lipids. It can be easily dissolved by disinfectants or soaps and kill the virus.

IIT Kharagpur has indigenously installed a tunnel at the entry for sanitizing visitors by spraying an atomized disinfectant in the form of mist on the visitors while passing through the tunnel. It does not need any drainage. This is effective and covers a large surface area unlike liquid disinfectant. This is supplementary to hand washing, social distancing and use of face mask by the public. It is priced commercially at Rs. 4 lakhs. This facility can be built in seven days.⁽¹⁷⁾

Disinfectant tunnels had been used in Chongqing, China in February 2020, in Sarajevo, Bosnia. It was used in Tiruppur, Tamilnadu at the entrance to a large market. Diluted 1percent Sodium Hypochlorite (one part per million) is used as disinfectant. It costs Rs.90000, consumes 50 litres of the solution in one hour and can operate for 16 hours continuously. Guadalajara, Mexico, established ozone based disinfection tunnels in a large food market to combat COVID-19.⁽¹⁸⁾

Similarly, two disinfection tunnels with machines, developed by IIT Delhi have been installed in Azadpur Mandi, Asia's largest fruit and vegetable market in Delhi. Delhi government plans to extend it to other wholesale markets.⁽¹⁹⁾

Disinfectant sprays using tunnels is not a good option of sanitizing individuals. Sodium hypochlorite, used in the spray is a powerful oxidizing agent. It can cause skin irritation, affect the respiratory tract which can trigger asthma, chronic respiratory diseases. This can also lead to environmental pollution.

Plasma Therapy

Plasma from recovered patients of COVID-19 patients, two weeks

after they test negative for the virus has emerged as a lifesaver in severe cases of COVID-19. It contains IgG antibodies against the infection. This modality of treatment is practised globally for severe patients, on ventilator support. The safety and efficacy of plasma therapy has not yet been established.⁽²⁰⁾

There are few success stories with plasma therapy. A 49 year old man admitted in a prominent private hospital in South Delhi on 4th April 2020. His condition worsened on 8th April and was on ventilator. His family arranged for plasma donor. Plasma was administered on 14th April 2020. His condition improved, put off the ventilator but with oxygen therapy, later discharged after testing negative twice for coronavirus.⁽¹⁵⁾

Similarly, one case was successful in Lok Nayak Hospital, a Delhi government hospital by using plasma therapy. Delhi Government has started contacting 1100 people who have recovered from COVID-19 to donate their plasma.^(21,22)

One patient in Mumbai's Lilavati hospital showed improvement after plasma therapy while one patient didn't recover from COVID-19. A small study in China on five severe COVID-19 patients on ventilator support showed improvement in symptoms in 10 days after plasma therapy. Considering the limited reports of usefulness, plasma therapy has received approval for emergency cases from FDA in US. It can lead to complications such as allergic reactions, transfusion related transmission of infectious agents, transfusion related acute lung injury or circulatory overload.⁽²⁰⁾

In India, Central Drugs Standard Control Organisation (CDSCO) has permitted ICMR to conduct an open label, randomised, controlled Phase II trial to evaluate the safety and efficacy of convalescent plasma in moderately ill COVID-19 patients.⁽²³⁾ ICMR has received approval from Drug Controller General of India (DCGI) to start human trials of the therapy on 18th April 2020.⁽²⁰⁾

Several organizations such as Defence Research Development Organization (DRDO), Indian Railways, few private entrepreneurs have developed disinfectant tunnels. Different manufacturers have kept the cost ranging between Rs.10,000 to Rs.1.5 lakhs.⁽²⁴⁾

SANITISING CHAMBERS OR VEHICLES

A sanitising chamber had been set up at the entrance of Institute of Kidney Diseases and Research Centre in Gujarat. It was equipped with a blower fixed to the ceiling of the chamber which sprayed non-irritant, alcohol based liquid disinfectant in misty form to a person standing in the chamber for 30 seconds. It sterilises the body surface, clothes and objects carried by the person.⁽²⁵⁾

ROBOTS IN PATIENT CARE

Robots have come handy in times of this pandemic. Robots work by connecting to sensor network and use artificial intelligence to come to a decision and perform accordingly. These are used in China, Singapore for disinfecting surfaces using ultraviolet radiation. In Providence Medical Centre, Washington, US, robots can take temperature and use a stethoscope on patients. In Lindlar, Germany, robots do outreach work in malls and inform the public of social distancing. Research is underway in the University of South Australia to use drone in scanning crowds for symptoms of COVID-19.⁽²⁶⁾

Use of robots in hospitals has come to a reality with India. Robots have the advantage that they can deliver medicines, foods and talk to the patients which can be monitored by doctors and nurses who can advise the patients through robots. This eliminates close contact between health care providers and COVID-19 patients, disrupting route of transmission of the novel coronavirus. One such example is "robot nurse" operated by a trained nurse in Stanley Medical College, Chennai which delivers food, water, medicines to COVID-19 patients.⁽²⁷⁾

An indigenously developed robotic trolley in India, named "Co-Bot" has been used in Jharkhand's COVID-19 railway hospital, Chakradharpur. It carries water bottles, sanitizers, food, medicines to the patients. The nurse operates it with remote control and asks patients to collect the items through a two-way speaker. There is zero contact between nurses and the patients. Its costs about Rs. 20000 as compared to Rs 20 lakhs for industrial robot.

Likewise, robot nurses are being developed in Tamilnadu, Delhi,

Mumbai. In Kochi, Kerala robots are utilised for spraying disinfectants, and distributing masks. A Kerala based startup, Asimov Robotics has developed a three-wheeled robot "KARMI-BOT" for patient care.⁽²⁸⁾

In AIIMS, New Delhi, Milagrow Human tech has installed humanoid robots "Milagrow ELF" at COVID-19 wards. It has helped in contactless monitoring of COVID-19 patients, disinfecting and sanitizing COVID-19 wards. A negative ion generator sends out millions of negative ions in the air. The positively charged viruses and bacteria are brought down to the floor. There is a water tank containing sodium hypochlorite which will be sprayed and destroy the microbes.⁽²⁹⁾

Drones In Covid-19 Surveillance

Drones have been used in the control of COVID-19 in the community. Government of India is collaborating with AGNI Mission and Invest India's Business Immunity Platform to facilitate the use of drone. In Varanasi, drone was used to spray disinfectant over large, crowded, vulnerable urban areas. This was done by "Helping Garuda Aerospace", a Chennai based startup. Such activity was planned to be extended to other cities of India.⁽³⁰⁾

Drones, mounted with loudspeakers and cameras, have been used by the police to inform people to stay indoors and obey nationwide lockdown without actually visiting the crowded areas.⁽³¹⁾ Tamilnadu had used 300 drones to sanitize the state with the help of Garuda Aerospace and first sanitization was done to disinfect Rajiv Gandhi Government General Hospital in Chennai.⁽³²⁾

Mobile Swab Collection

Minimised human contact to prevent transmission of SARS CoV-2 virus has been done by construction of 'Phone booths', a kiosk made of glass panels and aluminium cabinet and manned by a technician who collects oral swabs using two arm-length neoprene rubber gloves fitted to two cavities in the glass panel. This is based on Korean model, being used in Jharkhand, Ghaziabad and Varanasi.⁽³³⁾

Tele Medicine

Government of India has issued guidelines on the use of telemedicine for consultation on COVID-19 related issues in addition to other health problems. Such facility is being operationalised through several institutes including AIIMS, New Delhi. This minimises contact of medical staff with the patients.⁽³⁴⁾

Medical Council of India along with Niti Aayog has formulated new guidelines for registered doctors to deliver telemedicine for consultation with patients. It provides norms and protocols related to physician patient relationship, evaluation, management, treatment, issues of liability, need for informed consent if physician initiates, maintenance of privacy, confidentiality of records, prescribing, health education and counselling. It can be done through video, audio, or text messages, chats, email, fax etc. The need for these modes would be decided by the physician in consultation with the client. Ministry of Health and Family Welfare, Government of India recommends use of telemedicine during the pandemic for other consultations.⁽³⁵⁾

Vaccine Against Coronavirus

Vaccine development against COVID-19 has been in rapid progress. Nearly 78 projects have reached active stage of development since sharing of genetic sequence of SARS CoV-2 by China to World Health Organization (WHO) on 12th January, 2020 as per reports of Coalition of Epidemic Preparedness Innovations (CEPI) which funds vaccine development.

CEPI has initiated eight COVID-19 vaccine development projects with Curevac, Inovio Pharmaceuticals, Moderna, Novavax, University of Hong Kong, University of Queensland, and a consortium led by Institut Pasteur. Besides Oxford vaccine, CEPI funded vaccine in phase 1 trials include Inovio's INO-4800 DNA vaccine candidate and Moderna's mRNA-1273 candidate. Vaccine development takes about 10.71 years, on an average. It has 6% probability of market entry.⁽³⁶⁾

World Health Organization (WHO) is tracking the progress of over 120 vaccines proposed across the world. Currently six vaccines are in clinical evaluation phase, one is approved and yet to start, and about 70 in the pre-clinical evaluation phase. The list of vaccines in clinical

trials as on 29th April 2020 are shown in Table 1.⁽³⁷⁾

Table 1. Vaccines in clinical trials

Platform	Type of candidate vaccine	Developer	Current stage of clinical evaluation/ regulatory status- Coronavirus candidate	Start Date
Non-replicating viral vector	Adenovirus Type 5 Vector	CanSino Biological Inc./Beijing Institute of Technology	Phase 2 ChiCTR2000031781 Phase 1 ChiCTR2000030906	10 April 2020 17 March 2020
Non-replicating viral vector	ChAdOx1	University of Oxford	Phase 1 / 2 NCT04324606	23 April 2020
DNA	DNA plasmid vaccine Electroporation vaccine	Inovio Pharmaceuticals	Phase 1 NCT04336410	3 April 2020
Inactivated	Inactivated	Beijing Institute of Biological Products/ Wuhan Institute of Biological Products	Phase 1 ChiCTR2000031809	10 April 2020
Inactivated	Inactivated + alum	Sinovac	Phase 1 NCT04352608	13 April 2020
RNA	mRNA	BioNTech/ Fosun Pharma/ Pfizer	Phase 1 / 2 2020-001038-36	Approved, not yet started
RNA	LNP-encapsulated mRNA	Moderna/ NIAID	Phase 1 NCT04283461	3 March 2020

University of Oxford, at Jenner Institute developed ChAdOx1 nCoV-19, a vaccine against novel coronavirus. This the sixth coronavirus vaccine in the first phase of clinical trials. The first human trial has been initiated on 23rd April 2020. The trial has recruited 800 volunteers aged 18 to 55 years, half of them will receive the coronavirus vaccine and remaining half will receive a vaccine against meningitis (controls).⁽³⁸⁾

Scientists have taken genes from the spike glycoprotein on the surface of SARS CoV-2 virus, and put them into a harmless virus, prepared from a weakened adenovirus which causes common cold, derived from chimpanzees, modified such that it cannot grow in humans to make a vaccine. This surface protein helps the virus to bind to Ace2 receptors to enter human cells. Once injected into the volunteer, it enters cells which starts producing coronavirus spike protein. This stimulates immune system to produce antibodies and activate killer T-cells to destroy infected cells. Serum Institute of India, Pune has partnered with Oxford University to manufacture the vaccine locally once the trial succeeds.⁽³⁶⁾

In Indian context, a made in India vaccine is expected to be available in one year's time. Two or three small companies are on tract to develop the vaccine in collaboration with big company.⁽³⁹⁾ There are nearly 30 corona vaccines are in different stages of development as on 6th May 2020.⁽⁴⁰⁾

LEPROSY VACCINE TRIAL

Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh has assessed the safety of Mycobacterium w (Mw) in four patients of COVID-19 and reported no adverse effects in pre-study phase. Mw is heat killed Mycobacterium indicus pranii, developed originally for leprosy. It acts through the receptor pathway and enhances host-T cell response. It can decrease cytokine storm seen in COVID-19 and can reduce mortality. It is used as an adjunctive immunomodulatory treatment in addition to routine standard care.

COVID-19 patients requiring oxygen improved significantly after injection of 0.3 ml of Mw vaccine. CSIR has approved the trial of Mw in three institutes.^(41,42)

CONCLUSION

India is rapidly deploying new technologies such as artificial intelligence, Aarogya Setu app, new testing kits, sanitizing vehicles, robots, drones and is supporting vaccine development against COVID-19.

CONFLICT OF INTEREST

There is no conflict of interest for the article

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