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GUEST EDITORIAL

Science close to checkmating COVID-19

Pandemics are not new to the human race. What is novel this time around is the spread of information disguised as scientific knowledge over real science, which is a new challenge to humans. Unlimited information has made populace happy in reading and sharing pseudo science and unverified information on social media platforms. Netizens are flooded with information on COVID-19, which earlier pandemics never witnessed.

Pandemics could have affected *Homo sapiens* ever since they began living in closely knit communities. Ancient civilizations had evolved their own systems and curative measures for protecting their people. History of civilizations has records of pandemic/epidemic starting from 430 BC when around two-thirds of the population died due to a disease, probably related to typhoid. The earliest influenza pandemic documented in science has been in the year 1889–90 where one million people lost their lives followed by the Spanish Flu in 1918, which took a toll of 20–50 million lives.

According to the Centers for Disease and Control Prevention (CDC), H1N1 virus caused the 1918 flu. In 1957, a new H2N2 flu virus triggered a pandemic with about 1.1 million deaths globally. Again, in 1968 an H3N2 influenza virus resulted in about one million deaths worldwide. After a gap of nearly 40 years, a new H1N1 influenza virus in 2009 caused a pandemic.

Barring the 1918 flu, the other pandemics did not result in lockdowns like the SARS-CoV-2 that is gripping the world currently. During each of these pandemics, science worked hard to bring solutions in the form of drugs, guidelines to handle the disease and vaccines to prevent the spread. The most important solution from science was to trace the origin of these viruses. Science, together with technology, developed methods to protect the human race against these pandemics.

Another major pandemic creating havoc among humans is the ‘mind pandemic’. This pandemic does not spread through a virus or human touch. The viruses of mind have been a constant companion of humanity, which are changing and evolving continuously. Unlike infections from viruses that are detected and halted, the virus of the mind can change and become destructive to

the living beings. An appropriate example of virus of the mind is the urge to create situations leading to war such as the World War II that resulted in at least deaths of 11 million people. Richard Brodie’s book, *The Virus of the Mind: The New Science of the Meme*, underlines the fact that the thought process in humans is not entirely their own but is influenced directly or indirectly through viruses of the mind. Such ideas may not be acknowledged as humans do not wish to realize that their thoughts are not in their control. Pandemics caused due to virus of human mind have resulted in economic turbulence and life losses.

In the past few months, the virus of the mind is in active mode through social media, which is flooded with COVID-19 information. In a bid to instant fame or stardom, people from various cross-sections of the society have thrown their hats in the ring doling out advice/precautions, and even worse, cure for COVID-19! This dissemination of information has a profound impact on the minds of the public, as false reports have staged an upper hand over genuine science. The world driven by pseudo science has the flow of information unlimited in a society where a press of a button leads to a world of happenings in front of the eyes. Humans fail to notice that such claims have not contained the pandemic, and they are in fact waiting for science to deliver solutions in form of vaccines or drugs. The situation became complex when many manuscripts were available on the web without the proper process of peer review for example BioRxiv, a preprint repository. The recent case of retraction of a manuscript on COVID-19 from reputed journals such as *The Lancet* and *The New England Journal of Medicine* has raised questions about the validity of information shared. In such a scenario, humanity requires adopting a broader perspective towards science and understanding that only science revealed the cause of earlier pandemics in history and not the information disguised as scientific knowledge.

An article in the *ACS Central Science*, *A Scientist’s Guide to Social Media* (<https://pubs.acs.org/doi/pdf/10.1021/acscentsci.9b01273>) elaborates how scientists who are working in the laboratories are far behind in the

use of social media to disseminate their work. Information passed on as scientific truth, though never verified, on the pandemic dominates the social media platforms. Wrong posts such as the virus causing COVID-19 does not thrive in cold/hot weather dominate social media platforms.

The World Health Organisation (WHO) under their column 'COVID-19 advice for the public: Mythbusters', states weather has no impact on the virus, to correct the misconception spread on social media. WHO advises thorough washing of hands and maintaining a safe distance to stop the spread of COVID-19 infection. There is a compelling requirement for a fact check of information exchanged to elevate minds from stress caused due to the pandemic. The CDC states the fear and anxiety caused due to several factors including restrictions for containment of the virus can be a basis for strong emotions among adults and children during the pandemic. Scientists can stem the spread of this falsified information through sharing of their work on public platforms.

A look at the timeline of events from the time the outbreak of the virus began in Wuhan, China, in the last week of December, science has handled the pandemic commendably. In a short time, the complete genome sequence of the virus was deciphered. In less than 12 weeks, major journals such as *Nature* and *Science* had scientific data on the virus. Most journals gave free access to papers published on the virus. WHO updates its literature database, a comprehensive multilingual source for research papers, on COVID-19 daily. Needless to state, the structural biologists, chemists, virologists and molecular modeling scientists, without any mix of words were able to repurpose and generate data, which could handle this pandemic well.

The 1918 pandemic had four major waves of disease reports starting from March 1918 and officially ending in April 1920, resulting in loss of millions of lives. The COVID-19 pandemic with proper policy planning and decisions resulted in slowing the spread of the disease. A slew of guidelines issued to prevent the infection spread lowered the mortality rate globally. The precautions imposed were because science worked hard to understand and halt the virus spread unlike the unverified scientific information that twists facts to make them more appealing.

The pandemic has united the scientific community in an effort to find a solution to fight SARS-CoV-2. Aside from engaging in new research for vaccines, scientists are testing available vaccines used for containment of other infections against COVID-19. The US government under its Operation Warp Speed (<https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker>) has zeroed on three vaccine candidates for funding of their Phase-3 trials: Moderna's mRNA-1273, The Univer-

sity of Oxford and AstraZeneca's AZD1222, and Pfizer and BioNTech's BNT162.

In addition, scientists quickly took a stock of the molecules, which had shown activity as antivirals in earlier studies or were working on the host (human) cells to provide support in fighting with the virus and started generating data about the activity of these molecules. Many clinical trials were initiated and a huge amount of data has been generated which help in narrowing down to the drug molecules that can act best on SARS-CoV-2. In India, in less than 100 days various national research organizations such as the Council for Scientific and Industrial Research (CSIR) (<https://urdip.res.in/covid19/>) and the Defense Research & Development Organization (DRDO) (<https://drdo.gov.in/drdo-developed-counter-covid-19-technologies>) have come out with novel technologies to counter COVID-19. Human trials of India's indigenous vaccine candidate, COVAXIN, have begun.

On the other hand, there are some lessons to learn from this current pandemic. There has been some data pertaining to treatment regimes, which includes use of certain drugs that were controversial. World over, chemists are making efforts to repurpose drugs used for different viral infections. Such a process ensures a quick solution as a new discovery will take more than 10 years to reach the market in the form of a drug. Data on Hydroxychloroquine (HCQ), Remdesivir and few other drugs led to discussions among various scientific forums.

Throughout its journey, science ensured the society benefits from its research. Science along with technology has delivered solutions to make life comfortable for all in the form of vaccines, healthcare products and drugs. We would like to reassure the public that scientists might not be smart in the use of social media to spread their genuine work. This should not take the credit away from scientists. The active propagation of facts disguised as scientific knowledge through social media platforms as correct information is unfortunate. There is no truth in such posts. It is time that scientists spare a little time from their schedules at labs to use social media to spread their work. Scientists should unite and propagate neither post-truth nor near-truth but absolute truth, which Science has always aspired to achieve.

Yes! Science is very close to checkmating COVID-19 pandemic.

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