



CORONA VIRUS, ITS EFFECTS AND SOLUTION-A REVIEW

*Dr. Kavitha K J¹[0000-0002-1819-7919], Dr. Reshma M², Rashmi M Hullamani³

¹ Associate Professor, ECE Dept., GM Institute of Technology, Davanagere, Karnataka, India

² Assistant Professor, ECE Dept., UBDTCE, Davanagere, Karnataka, India

³ Assistant Professor, ETE Dept., JNNCE, Shimoga, Karnataka

kavithakj219@gmail.com, reshma.m03@gmail.com, rashmimh@jnnce.ac.in

Abstract:

The year 2019 is a outbreak year during which the whole globe has suffered from Covid19 pandemic which has been spotted initially in China and later spread to the whole world; as a result of this viral disease, the whole world had shut down affecting billions of people but till today the Covid battle is on and people are suffering not only from this disease but also in terms of economy, starving being jobless etc. This paper briefs about Corona virus, its types, and structure; the replication and spreading of this virus, Covid19 detection methods, research on vaccination developed across the world to curb this virus; virus impact on various sectors, precautions to be taken to stay away from this virus and Ayurvedic remedy for it. The waves of corona had taken many lives on the globe & have its effect on life style of people. To curb this virus, prevention vaccination has to be found and we people must change in a way so that we could avoid future consequences for the upcoming generation.

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1. Introduction:

The whole world was under tremendous pandemic outbreak during the year 2019-2020, and most of the people around the globe suffered from a new disease named COVID-19 and the name "COVID" stands for Corona Virus Disease.

Corona viruses are group of Ribonucleic acid (RNA) viruses known to affect birds and mammals including human beings. Few of these viruses cause a variety of diseases ranging from common cold up to severe respiratory problem. The very first corona virus infection identified in domesticated chickens suffered from minute respiratory problem known to occur in the early 1920s in North America, whereas the first human affecting corona virus was discovered in 1960s by June Almeida and David Tyrrell in two countries United Kingdom (UK) and United States (US) using two different procedures and they coined the

virus name as 'Corona' a Latin name as it has crown like spiky structure and this name globally accepted by the committee "International Committee for the Nomenclature of Viruses" in the year 1971. There is hundreds of corona viruses belong to the subfamily Orthocoronavirinae, in the family Coronaviridae but all of them are not dangerous, only seven of them cause infection to human beings. Four out of seven corona virus cause mild infection in proboscis airways, oesophagus, alveolus and ant-rum which is broadly categorized under four groups as:

- Alpha 229E corona virus
- Alpha NL63 corona virus
- Beta OC43 corona virus
- Beta HKU1 corona virus

Whereas, the remaining three corona viruses known to cause severe ailment in human beings such as:



- Severe Acute Respiratory Syndrome Corona Virus (SARS-CoV),
- Middle East Respiratory Syndrome Corona Virus (MERS-CoV),
- SARS-CoV-2

The first type of SARS-CoV shown in figure 1 spread in 2002 in the province Guangdong of China and known to spread in nearly 26 countries affecting more than 8000 people and common symptoms of this virus includes pyrexia, fatigue, ice-freezing effect, myalgia, a pertussis, gasping and constipation. But since from the year 2004, there is no news about the effect of this virus.



Figure 1: SARS-COV

The first case of MERS-CoV (shown in figure 2) reported in Saudi Arabia in the year 2012 and according to World Health Organization (WHO), common symptoms of this virus includes fever, cough and breathing problem which can spread through close contact with animals, specifically with camels and also through human beings. Since from the year 2012 to till date, this disease known to occur in the middle east and there had been 2494 cases and nearly 900 death cases and also there is no vaccine available for this disease.



Figure 2: MERS-COV

In the year 2019, the first case of SARS-CoV-2 which causes COVID19 is reported in Wuhan city

of China and common symptoms of this disease is almost same as SARS-CoV and in addition, it includes body and head ache. And the person with COVID19 not necessarily suffers from all mentioned symptoms. Nearly 112,305,539 COVID19 cases are reported around the globe, out of which 2,486,641 people dead and 87,839,837 recovered from the disease reported till date and keep varying based on the existence and effect by this virus. The figure 3 shows SARS-CoV-2 and figure 4 shows the detailed structure of it [2].



Figure 3: SARS-CoV-2

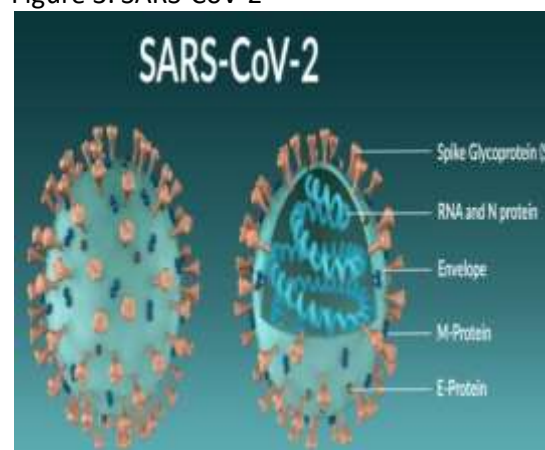


Figure 4: Detailed Structure of SARS-CoV-2

The researchers around the globe have analysed 103 genomes and they found two common prevalent strains called as L and S type. According to various studies and analysis made by the researchers, it is been found that 70% of the cases contains L-type virus and these viruses are derived from ancestor S-type virus and it can transmit & replicates faster in human beings.

As it is been observed that, the Covid-19 disease is likely to affect and occur in old age people, diabetic patients and people suffering from severe medical implications. And also it known that, this disease may harm various human body parts such as heart, lungs and brain. According to the

observations made by the researchers on covid19 patients who have recovered, most of them had damage to the heart muscle which in turn increases the risk of heart failure, alveoli in the lungs resulting in life-long breathing problems, result in temporary brain paralysis and may also leads to the development of diseases like Parkinson's and Alzheimer's diseases. It can also cause blood clots in heart, legs, lungs, liver and kidneys and makes the patient to suffer from depression and anxiety. To avoid severe damages and problems caused by this virus, one need to pre identify the presence of corona virus and to undergo precautions to get rid of the disease imposed by it. Often, most of the people may get ambiguity between Pneumonia and Covid19 pneumonia. According to the studies made by North-western University on Covid19 reveals; Pneumonia caused by bacteria and influenza virus spread across large regions of lungs rapidly within no time, can be controlled in few days by injecting antibiotics or by increasing the immune system of a person whereas, covid19 pneumonia infection occurs differently rather than common pneumonia. Covid19 pneumonia caused by SARS-CoV-2 makes multiple small rooms for its survival in the lungs and attacks lungs immune cells and uses these cells to spread across the regions of lungs slowly for days together or weeks and causes damages to the organs aforementioned above. So, it is required to have easy and effective method to detect the presence of this virus at early stages to avoid further health complications in individuals.

2. Covid19 virus infection:

SARS-CoV2-Covid19 virus use angiotensin converting enzyme-2 (ACE2) as a receptor to enter into the human host cell as shown in figure 5 and these receptors extensively present in nose, lower respiratory organ, heart, gastro-intestinal system, kidney and endothelial cells in human beings. The ACE-2 receptor allows the virus to attach & bind its protein called as spike protein or S-proteins present on its surface to the receptors and release its RNA into the cell [3].

Figure 5: SARS-CoV-2 entry through ACE2 receptor

3. Covid19 virus spread in human beings:

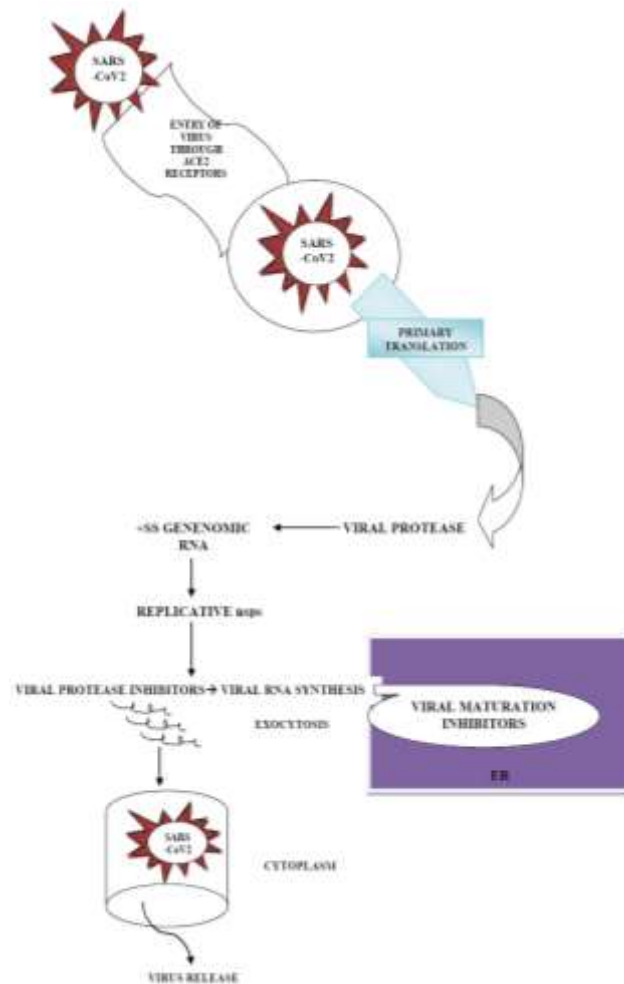


Figure 6: SARS-CoV-2 replication and spread

The Covid-19 SARS-CoV2 virus gains entry to the human system through ACE2 receptors and is bind to the viral RNA protease through primary translation process and produces RNA polymerase protein (RdRp), an enzyme which produces RNA molecule templates using current RNA strand in

the host [4]. These proteins create replicates of viral genome RNA but at the same time it is also true that it doesn't constantly replicate the whole RNA; for every so often, it stops creation of premature & shorter RNA strands known as sub-genomic RNAs. The figure 6 shows the overall process that is involved in the creation, replication and release of corona virus SARS-Cov2 and as we can see that swarm ribosome will translate these sub-genomic RNAs to proteins and they are cut into the individual structural proteins by the specific enzymes called as 'Proteases' that come along with sub-genomic RNAs. In the next step, these proteins and replicated viral RNA is packaged into a new virus which is released from the host cell and ready to infect to another host cell of human being.

4. Covid19 virus detection methods:

Scientists around the world have identified many ways to detect SARS-COV-2 virus and some of the methods are listed and explained below:

A. Nucleic Acid Detection based approaches:

- Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) method: As we have seen everywhere, to test covid19 virus, testing centres collect swabs from nasal cavities and pharynx into the virus transport medium which contains Hanks Balanced Salt Solution (HBSS) with Calcium and Magnesium and contains heat-inactivated Fetal Bovine Serum, Gentamycin and Amphotericin B and sent to the testing lab. From the sample, RNA is extracted and added to PCR mix which contains RT enzyme which converts this to DNA and it also contains two reagents namely 'primers' and 'probes'. The primer reagent is used to make copies whereas probes reagent is used to detect the specific sequence in the DNA sample. In this whole process, DNA is amplified and is tested against controls. To get non presence of SAR-CoV-2 virus, RNase P should show amplification, positive control must be positive and negative control must be negative ensuring no presence of corona virus else represents its presence. But this method is limited in its effectiveness when tested for huge samples as it is inconsistent with biological fluctuation found in RNA tissues and may result in wrong diagnosis [5].
- High-throughput genome sequencing method (HTGS): It is also popularly known as Next Generation Sequencing (NGS) method which

is innovative method substituting microarray and it is one of the efficient tools to extract information about nucleic acids. In HTGS method, DNA genomes sequenced and assembled and the sequences read can be taken either from a single or double end long fragmented RNA/DNA. The strategy of double end read is more accurate than single read. However, this method gives biased results due to alignment of reads against a reference genome sequence [6].

- Loop-mediated isothermal amplification methods (LM-IA): This method is popularly known as isothermal LAMP and is based on DNA amplification-Watson-Crick base pairing concept as it act as a decision factor for DNA replication and ensures only complimentary base form pairs. LAMP, earlier and today also used in detection of certain diseases like tuberculosis-a lung disease caused by Mycobacterium africanum, trypanosomiasis-a sleeping sickness caused by trypanosomes parasitic protozoan which is transmitted by tsetse fly bite, malaria-a life threatening infectious disease caused by a mosquito bite because of its simplicity due to extermination of extravagant thermo cyclers, huskiness, inexpensive medical screen assay [7].

B. Clustered Regularly Interspaced Short Palindromic Repeats/Cas Proteins (CRISPR/CP) based approaches:

- Antibody-based Serology detection method (AS): It is also called Serology or antibody test as it is used for antibody testing. Using this method, antibodies that causes corona like diseases can be detected within three or four days and these tests are much cheaper than genetic tests. As it is known that, antibodies are kind of proteins released from white blood cells to fight against foreign agents and such tests are more helpful in finding large number of infected and recovered patients. Due to such action of this technique, the serology methods are not suitable for early detection of corona virus as it can be used only after infection and very difficult to identify whether a patient is already infected, recovered or newly infected and hence its usage is restricted only for epidemiological studies [8].
- Enzyme-linked immunosorbent assay method (ELISA): It is also called as Enzyme immunoassay which is a bio-chemical method and this method involves enzymatic reaction which results in a

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signal which is used to identify the presence of specific substances like antigens, antibodies, hormones and drugs. This method is susceptible, explicit and moreover it is cheaper which encourages the clinicians to use this as preliminary analytic equipment and its testing efficiency is very good in the lab environment and it is widely used in the detection of Human Immunodeficiency Virus (HIV). To detect Covid19 using ELISA method, clinicians tests IgM & IgG of patients as IgG immunoglobulin is produced in large quantity whenever patients are virally infected and IgM responses very fast for early viral detection. ELISA is usually used as a complementary approach that can be used for covid disease detection after the confirmation of the infection with nucleic acid based test technique [9].

- Lateral flow immunochromatographic assays (LFIA): It is also called as Lateral flow or rapid test which is widely used to identify the target substance in a liquid in homes, point of care or lab, which works on the same principles as that of ELISA method. The testing slab used in this method, consists of conjugate pads and when fluid is put on to this pad, it flows to the second layer where it contains frozen dried bioactive elements in a salt-sugar matrix and the reagents required for optimized chemical reaction between antigen and antibody and it shows the results as that of pregnancy test on the control lines [10].

Based on the above test used across the world, which was helpful in identifying the SARS-CoV2 infected persons which indeed helped government and health care providers to prevent its spread across millions of people. The below chart (figure 7) shows infected persons, the death rate, and recovered rate infected by the coronavirus across the globe.

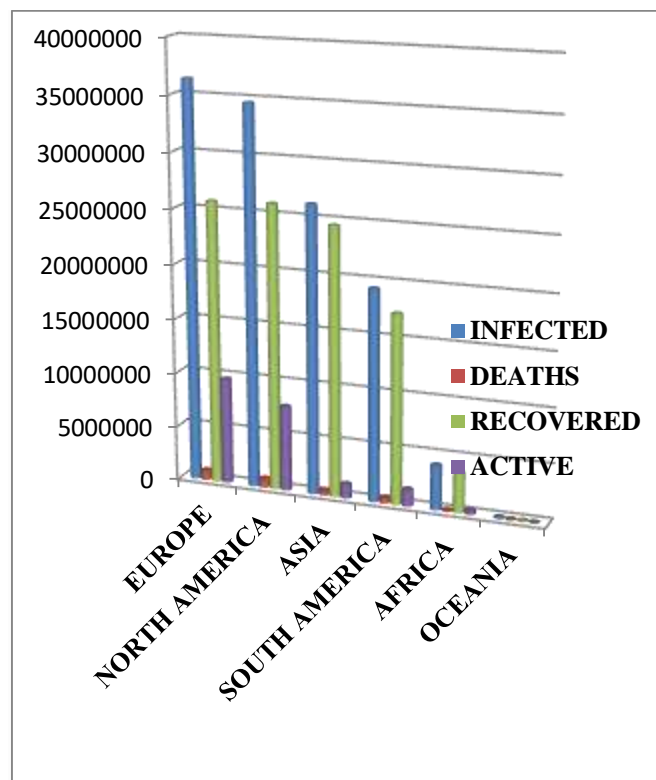


Figure 7: Chart showing infected, death, and recovered rate due to coronavirus across the world

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From the chart we can see that, the virus more affected in Europe, North America, Asia and South American countries; although recovery and death rate are low, there is a risk of spread of this viral diseases among the community as it simply pass on everyone just by a touch or if no distance between persons is maintained and we might fall short of medicines and so many other issues.

5. Impact of corona virus on various sectors:

The business sectors can be classified into three types: primary, secondary and tertiary. In this section brief information regarding the challenges and difficulties faced by various categories belonging to different sectors will be discussed. Even before the pandemic, the various sectors had faced problems like decreased income, interrupted various supply chains, awful severe hunger rose due to other factors [11,12].

Primary sectors: It includes agriculture, petroleum & oil business. In India, Agriculture sector is one of the biggest contributors to the GDP of our nation, which faced enormous qualms due to corona pandemic. The country was facing a lot of problems such as decreased income, disrupted



supply link, hungers even before covid19 due to the influence of various other factors like natural hazards-floods, climate variation, social economic conditions and bugs. The conditions of people much worsened after lockdown in the year 2020; On March 25, 2020 the government imposed lockdown over the entire nation due to which the conditions of the farmers worsened; resulted in disconnection of food supply link, struggled to get the seeds for sowing, pesticides during harvesting season, transportation was blocked and so on. A collaboration that has been established between Accel Partners and Omnivore (agritech-focused VC), the report released by these partners says that lockdown had introduced an accidental consequence of accelerating nations ongoing agritech ecosystem. Due to scarcity of agricultural products, there was increase nearly 20% increase in the food prices across the globe; also due to such high retail food prices and with less salary, most people have reduced the quantity & quality of food utilization and this viral disease has estimated to create food insecure to millions of people. During the year 2019-2020, the production of petroleum & oil dropped down by 6.1% & 5.2% respectively and followed with the affection of covid19 resulting in 5.5% drop of crude oil production and 14.38% drop in natural gas. The price war of oil & gas is continuing even after the overcome of lockdown period.

Secondary sector: It includes manufacturing industries wherein the production of products and other work is greatly affected due to insufficient of goods supply, self-isolation lead to the slow progress among the individuals, insufficient import of various things and so on and became major challenging task to be handled in person.

Tertiary sector: It includes education centres, healthcare centres, pharmaceutical industries, hospitality, and tourism & aviation system. Due to rapid spread of corona virus, educational institutes remain close which has impacted nearly 900 million students as reported by UNESCO. Many of the students from below poverty line have dropped out from the schools due to non-availability of social mobility and not able to afford free school meals. Healthcare systems have got more responsibility to save people from Covid19-pandemic but at the same time healthcare staff lives were under risk. For pharmaceutical industries, opportunities have increased to invest

themselves in finding the vaccine and producing the drugs to overcome covid19 pandemic situation. The tourism sector is greatly affected by the outbreak of covid19 resulting in breakdown of the link of travel supply and decreased demand which in turn resulted in the risk of 50 million jobs and loss of billions of dollars.

Impact of corona on profession across the world: Due to pandemic situation all over the world, many industries suffered from heavy loss which in turn made owners to take off jobs of youths unintentionally. Across the world, millions of youths lost their job and according to report given by the International Labour Organization (ILO) and the Asian Development Bank (ADB) in India alone, it is estimated that nearly 4.1 million youth have lost their jobs.

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6. Remedy for Covid19:

A famous proverb told by our elders 'Prevention is better than cure' needs to be followed by everyone starting from children up to old age people to improve immune power. We can avoid infection not only by corona virus but also with some home remedial foods which are adopted by our ancestors and here some of the simple procedures are listed below [13]:

- Gargling with lukewarm water mixed with haldi (turmeric) and salt everyday
- Drinking lukewarm water mixed with lemon juice (Citric acid) in empty stomach everyday
- Consuming naturally available fruits, vegetables and leafy vegetables
- Eating raw ginger and garlic or can be used in food
- Avoid using green chillies and instead use red chillies (dry) or powder in cooking
- Use spicy items like pepper, clove, cardamom, cumin seeds, mustard seeds, Elaichi, Fenugreek etc in daily foods in a balanced proportion.
- Avoid consuming sugar instead use crystal sugar or jaggery.
- Avoid taking junk food
- Use less oil in the cooking
- Consuming buttermilk and coconut water during day time
- Taking food at regular intervals of time
- Having soundless sleep at least for 7 hours in a day



- Doing exercise or meditation or yoga, walking everyday
- Taking steam often (if not possible daily)
- Wash your hands and legs after coming home from outside

Even we follow all these procedure, sometime we may fall sick or get infected by the viruses like SARS Cov-2 and in such conditions, one need to take early precaution and should take proper medicine and vaccination.

7. Impact of Covid19 on human lifestyle:

In 2015, Bill Gates, a technologist, business leader, and philanthropist expressed that viruses are the greatest threat to the global devastation than any other threats to the humanity; if anything that kills over millions of people; it is mostly due to infectious viruses compared to any war or missiles. And as we can see, five years later in the year 2019-2020, the whole world become stun and stand on its knee due to Corona virus-SARS Cov-2 and every activity like business, schools, colleges, travelling and so on completely shut down and most of the people who had come for their livelihood went back homes due to non availability of wages. Many of them who were out of station stuck back in the places they were and faced problems but still stand before the government order to avoid the spread of viruses. Most of the schools & colleges are completely closed and many of the teachers, clerks lost their job and became straw and for survival started working as a street seller.

As Covid-19 created a global health crisis, it has impacted more on older people especially those with chronic health conditions such as hypertension, cardiovascular disease and diabetes. Disabled persons faced and are still facing difficulties in getting service rendered by health care systems and also covid19 infection is influenced by other issues which are related to increase of illness to the extreme or even lead to the death of a person.

To overcome so many issues that rose due to Covid19, the governments vociferated youths to protect themselves from the impact of covid by following the precautions guided by health centres and also awakened youngsters to help susceptible people and assist or encourage them

to follow covid19 preventing measures to suppress the impact of this viral disease. Also government had called upon researchers and youngsters to come up with an idea of finding the solution or medicine to suppress covid19 virus.

8. Covid19 vaccinations across the world:

To bring Covid19 pandemic situation to an end, scientists across the world involve themselves in search of medicine in terms of vaccination and within 12 months from the beginning of this disease, facing so many challenges, finally researchers succeeded in finding vaccine which fight against SARS Cov-2 virus[1] while maintaining safety, immunogenicity, efficiency, dose level and adverse effects of the patients and really reaching the expectations of the whole world. Here we discuss about vaccines which are developed across the world based on different technologies invented in various countries which are suitable to all kinds of human beings. The covid19 vaccines are categorized as below [14,15]:

RNA vaccines: It is the first type of Covid19 vaccine which has been approved in United States and European Union. These vaccines contains RNA when injected into the body, it acts as a messenger RNA (mRNA) which build foreign protein which produces adaptive immune system which trains the body to identify and destruct pathogen cells. Pfizer-BioNTech vaccine was the first Covid19 vaccine came to use on December 11th 2020 after the successful clinical trial data with 95% effective and is originated in United States and Germany. This vaccine needs to be stored in the temperature -80 to -60°C. This vaccine was developed by a German company BioNTech in joint association with Pfizer and the clinical trials were started in April 2020 and it has been started testing over 40000 of people by the month of November and it was first authorized by United Kingdom in December 2020, to use this vaccine on an emergency basis, soon adopted by the United States, the European Union and many other countries globally. The table 1 lists various covid19 vaccines developed across the globe.

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Ayurvedic practitioners in India, has also contributed by conducting clinical trial for Ayurvedic formulations to fight against SARS-Cov-2 virus which is the cause for Covid19 sickness and Ayurvedic medicine makers have said that the Ayurvedic treatments 'Immunofree' and 'Regimmune' are likely to fight against corona virus found to work efficiently than standard medicine. However, Government of India Ministry of Health & Family Welfare Directorate General of Health Services (EMR Division) has suggested to follow holistic approaches for the wellbeing of post Covid recovering patients and may be adopted by everyone for maintain individuals health and some of the approaches are listed below:

- Use mask, hand wash at regular intervals of time ,maintain hygiene and physical distancing
- Taking Immunity increasing Ayush medicines as suggested by doctors
- Involving themselves in household work
- Mild or moderate exercise
- Daily practise of yogasana, pranayama and meditation depending on individuals health
- Breathing exercises
- Daily morning or evening walk at a tolerable pace
- Balanced nutrition diet
- Adequate sleep and rest
- Avoid smoking and alcohol

- Self health monitoring at home temperature, blood pressure, blood sugar (especially, if diabetic), pulse-oximetry and so on
- Do saline gargles mixed with herbs or spices and take steam inhalation in case of cough or sore throat
- Monitoring early signs of high fever, breathlessness, SpO2 < 95%, unexplained chest pain, new onset of confusion, focal weakness.
- Recovered covid19 patients may share their positive experiences with others to avoid pandemic conditions among individuals
- If required, seek suggestions from counsellors of health sectors.

As covid pandemic is still on, it would be better everyone on this planet follow these approaches and make themselves more immune to fight against not only covid19 virus but also future new viruses.

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9. Next wave of Covid19:

Even though, Covid19 vaccination are available but the percentage of people, taking vaccination across the world is very less and as a result, this viral disease is spreading 6% much faster in 2021 than the previous year 2020. The figure 8 shows the rise in infected rate in India and figure 9 shows the rate across the world:

Table 1:Covid-19 vaccines available across the globe

Vaccine	Efficiency of Vaccine against SARS-CoV2	Number of doses	Origin
Moderna vaccine	89–97%	2 doses 4 weeks	United States
Pfizer–BioNTech vaccine	90–97%	2 doses 3-4 weeks	Germany
Sputnik V	86–95%	2 doses- 3 weeks	Russia
Oxford–AstraZeneca vaccine	62–90%	2 doses-4-12 weeks	United Kingdom
Novavax vaccine	75–95%	2 doses	United States
	20–80%	3-4 weeks	



Vaccine	Efficiency of Vaccine against SARS-CoV2	Number of doses	Origin
BBIBP-CorV	~79%	2 doses-3-4 weeks	China
CoronaVac	~78%	2 doses-2 weeks	China
Johnson & Johnson vaccine	49–82% (moderate cases)	1 dose	United States
Covaxin	~81%	2 doses-4 weeks	India
Covishield	90%	2 doses-4-12 weeks	

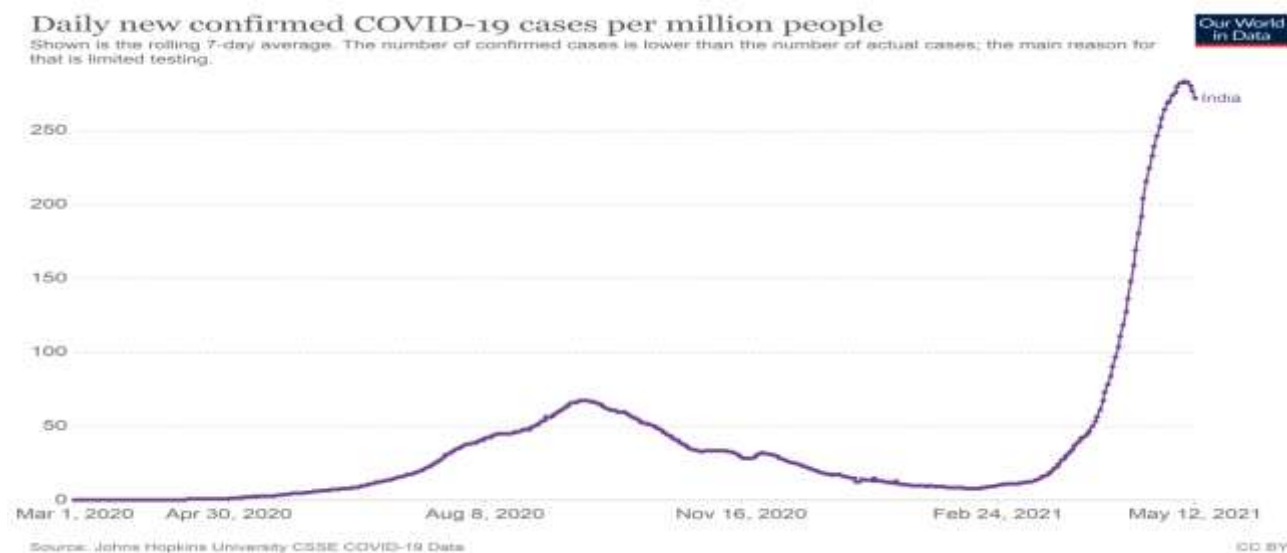


Figure 8: Covid19 Infection rate in India

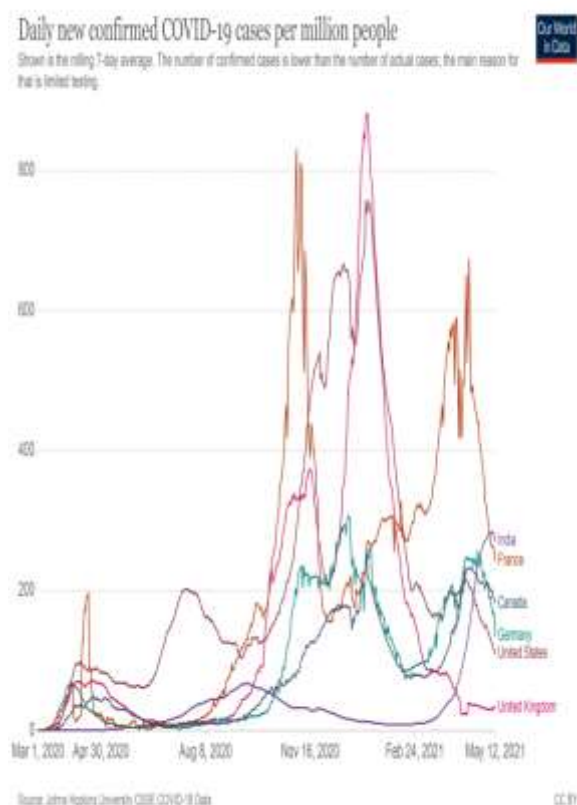


Figure 9: Covid19 Infection rate across various countries

The vaccinations introduced so far help in increasing the immunity level but do not help in prevention and hence there is a need of more powerful vaccination to be produced by the medical practitioners to avoid infection.

The 2nd wave of corona infection is spreading much faster and also there is increase in death rate in India and 3rd wave is about to hit the entire world. Only the solution to this, is to break spreading chain link by locking ourselves in home by staying safe for certain days and thereafter also by taking required precautionary steps to make better life.

10. Conclusion:

The viral disease Covid19 is mutating every time and it has become difficult to identify its structure, how it is been spreading, and also to trace primary & secondary contacts of this disease. The covid battle is still on although vaccination is on. Still research on developing vaccine/medicine is taking place across the world, but anyhow these types of viral disease don't have any end. As of Covid19 viral disease is concerned, people must take every precaution to stay away from it. Even if we are able to get rid of corona viruses, new viral disease

can be introduced; we being human are solely responsible for such cause and it is well known that everything has a start and an end and so we can hope for good days to arrive & at the same time; So, we need to take care of nature, control in population growth, lifestyle etc. to have better days for present & future generation.

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