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Mini Review

A Minireview on Pandemic Novel COVID-19

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Abstract

Human history is observing a very strange time fighting an invisible enemy, the novel COVID-19 coronavirus. initially observed in the Wuhan province of China, now vastly spreading around the world. The Pandemic which COVID-19 has made on the Globe needs no depiction. The virus has been accounted for to be affecting the lungs and related respiratory tracts promoting harm of the alveoli. It has been accounted the respiratory sickness is the prevailing Clinical indication of COVID-19. This review article discussed for an easily understanding of the causes, different type of Human viruses regarded of Coronavirus, clinical diagnosis of RT-PCR, Primary prevention and control of the virus. Therefore, this review article main theme is focusing on more research work to be carried out to provide more reliable and valid effect to control and mange public emergency in both acute and chronic conditions of coronavirus.

Keywords: COVID-19; Pandemic; RT-PCR; Prevention; Respiratory

Introduction

In late December 2019, a bunch of pneumonia cases, caused about by a recently distinguished beta coronavirus, happened in Wuhan, China. This coronavirus, was at first named as the 2019 novel coronavirus on 12 January 2020 by World Health Organization (WHO), WHO authoritatively named the disease as coronavirus disease 2019 (COVID19) and coronavirus study group (CSG) of the International Committee proposed to name the new coronavirus as SARS-CoV-2, both issued on 11th February 2020. The Chinese researchers quickly isolated a SARS-CoV2 from a patient inside a kbrief time frame on 7th January 2020 and came out to genome sequencing of the SARS-CoV-2. Starting at 1st March 2020, an aggregate of 79,968 cases of COVID-19 have been confirmed in territory China including 2873 passing [1-4].

Coronavirus morphological features: Coronavirus are large pleomorphic spherical particles with bulbous surface projection the diameter of the virus particles is around 120 nm. The viral envelope consists of a lipid bilayer membrane, spike structural proteins are anchored, the positive-sense single-standard RNA genome in a continuous beads on a string type conformation. The genome size for coronavirus ranges from approximately 27 to 34 kilobases [5,6].

Structural Protein	Function of Protein
Nucleocapsid Protein (N)	Bound to RNA genome to make up nucleocapsid
Spike Protein (S)	Critical for Binding of host cell receptor to facilities entry of host cell
Membrane Protein (M)	Central organizer of CoV assembly Determines shapes of viral envelope
Envelope Protein (E)	Interacts with M to form viral envelope

Table 1: Structure of coronavirus.

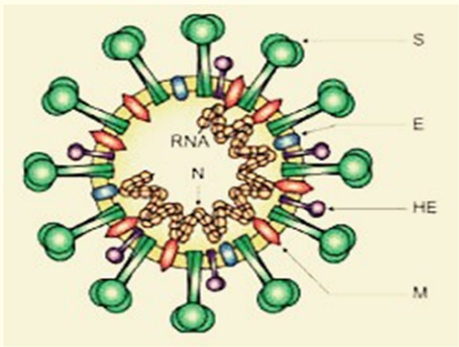

Figure 1: Image of coronavirus.

Virus	Genes	Disease	Discovered
CoV-229E	Alpha	Mid respiratory tract infection	1967
CoV-NL-63	Alpha	Mid respiratory tract infection	1965
CoV-HKU-1	Beta	Mid respiratory tract infection pneumonia	2005
CoV-OC43	Beta	Mid respiratory	2004
SARS-CoV	Beta	Human severe acute respiratory syndrome, 10% mortality rate	2003
MERS-CoV	Beta	Human severe acute respiratory syndrome 37% mortality rate	2012

Table 2: Human corona virus [7].

Life cycle of coronavirus [8,9]: Life cycle of coronavirus has 4 steps of viral life in human:

1. Attachment and entry
2. Transmission of replicase gene from viral RNA
3. Replication and transcription
4. Assembly and release.

Attachment and entry: The connection of the virus to the membrane is begun cooperation between two components i.e. S protein and its receptor. S protein contain the receptor binding domain (RBD) on which the virus connects first. The virus fog have section into the cytosol hence for that it will perform following activities:

1. Cleavage of S Protein
2. This cleavage exposes the fusion peptides
3. The two peptide will join to S2 site
4. This will form the bundle
5. The bundle pack is liable for the mixing of the viral and cellular membrane then the fusion of the membrane occurs
6. At last the virus will release its viral genome into the cytosol of the cell.

Transmission of replicate gene from viral RNA

Replicate gene encoded two enormous ORES which are rep1a and rep1b which are answerable for the coding of two proteins that is pp1a and pp1ab. To communicate this two proteins, the virus need to utilize slippery sequence and pseudoknot which is liable for ribosomal frameshifting. For the most part ribosome loosen up the Pseudoknot and proceed with the interpretation until stop codon shows up to stop the procedure. In some cases, the pseudoknot stops the ribosome for the translation process which results in frame shifting of ribosomes. Polyprotein contains NSPS 1 - 11 and 1 - 16. Numerous NSPS accumulates into replicate transcription complex (RTC) to make an situation which is useful for RNA synthesis. This outcomes in replication of RNA and sub-genomic RNA transcription.

Replication and transcription

RNA synthesis produces genome RNA and sub-genomic RNA. This sub-genomic RNA GI about as m-RNA for both auxiliary and adornment genes. Genomic and sub-genomic RNA are delivered through negative strand mediate.

Assembly and release

In the wake of shaping sub-genomic RNA Union and replication, the basic proteins i.e. S, M, E and N are first made an interpretation of and afterwards embedded into the endoplasmic reticulum. This protein moves towards endoplasmic reticulum golgi middle compartment. At this site the develop virus are shaped and gathered. This recently formed viruses then got discharge from the cell to deliver more viruses.

Incubation period of the virus on different surfaces

The coronavirus is very sensitive it can live in air up to 3 hrs.

S. No	Surface type	Incubation period
1.	Air	3 hrs
2.	Copper	4 hrs
3.	Card board	24 hrs/1day
4.	Plastic material	48 - 72 hrs
5.	Stainless steel	48 - 72 hrs

Table 3: Incubation period of the virus on different surfaces [10].

Symptoms [11]

Maximum of the patients infected with the coronavirus will encounter normal cold and flu, 80% of patients will show mild symptoms of this COVID-19 diseases. Adult have the best immunity power to fight against the infection but the demerit is that they are more likely to spread the infection of virus. 99% of the patients built up a fever with very high temperature, while the greater part experienced fatigue and dry cough and trouble in breathing. Maximum of patients have infected extreme cases and remaining have become critically I'll. Step by step breakdown of coronavirus symptoms how indications progress among typical patients, how the disease COVID-19, goes from terrible to worse.

Day 1: In the beginning day of the side effects, the patient experiences fever along with fatigue, muscle torment and a dry cough. Not many of them may encounter sickness and loose bowels a couple of drug before the excitement of indications.

Day 5: Patients may experience the ill effects of breathing issue particularly in the event that they are older or have some prior well being condition.

Day 7: According to the Wuhan university study, these are the side effects of the patient that lead the patient to be conducted in the clinic.

Day 8: Patients develop acute respiratory distress syndrome (ARDS) a condition where the liquid fills up in the lungs and this is mostly fatal this typically occurs in serious cases.

Day 10: The movement of the ailment prompts intensifying of the indication and now the patients is moved to ICU. patients with milder symptoms most likely have progressively stomach pain and loss of appetite only a small fraction die.

Day 17: On average, after nearly 18 to 19 days patients who recover are discharged from the hospital however, its difficult to find out the symptoms in the earlier days of the infection. This is generally observed following 5 - 6 days.

Most common: Fever, dry cough, dysponea, chest pain, fatigue, myalgia, loss of smell and taste.

Less common: Headache, Dizziness, Abdominal pain, Diarrhea, Nausea and vomiting.

Severe complication reported among COVID-19 patients: Hypoxemia, ARDS, Arrhythmia, Shock, Acute cardiac injury and Acute kidney injury.

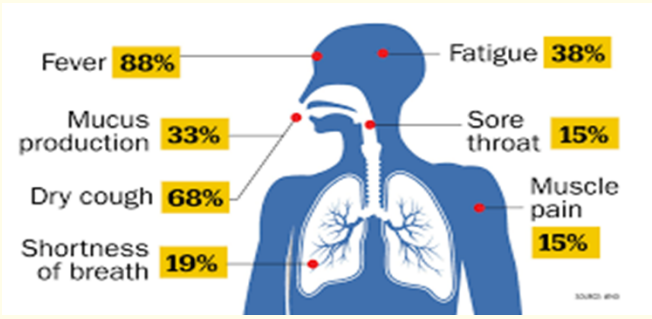

Figure 2: Image of coronavirus symptoms.

Diagnosis [12-14]

As the coronavirus that causes the COVID-19 malady spreads over the world, for the identification of viruses use real time reverse transcription polymerase chain reaction (RT-PCR). The real time RT-PCR one of the most precise research facility technique for identifying, tracking and contemplating the coronavirus.

What is real time RT-PCR?

For recognizing the presence of explicit hereditary material from any pathogen, including a virus the real time RT-PCR technique is utilized. In this strategy radioactive isotopes markers are utilized to identify focused on hereditary materials, however ensuring refining has prompted the supplanting of the isotopic naming with unique markers, most much of the time fluorescent colors. This strategy is the choice for diagnosis of human CoV, as multiplex real time RT-PCR assays have been created. They can recognize each of the four respiratory HCoVs and could be additionally adjusted to novel CoVs. Serologic examines are significant in case of RNA maybe very hard to isolate and it is no longer present and for epidemiological studies. It was recommended by the Chinese centre for disease control and prevention to utilize groundworks and tests like ORF1ab and N gene regions for the detection of SARS CoV-2 by RT-PCR.

Why use real time RT-PCR?

1. This method is profoundly delicate and explicit.
2. It can deliver a reliable identified as quick as 3 hours.
3. It is essentially quicker than the other methods which utilized for the Isolation of virus.
4. This method has a lower potential for contamination or mistakes as the whole procedures should be done with in a closed tube.
5. It keeps on being the most exact technique available for detection of the COVID-19 viruses.
6. Different techniques for determination like CT check, High-throughout sequencing also been suggested by different health authorities.

Primary prevention [15]

1. Wash your hands frequently for at least 20 seconds at a time with warm water and soap.
2. Don't touch your face, eyes, nose or mouth when your hands are dirty.
3. Don't go out if you're feeling sick or have any cold or flu signs and symptoms.
4. Cover your mouth with the inside of your elbow whenever you sneeze or cough. Throw away any tissues you use right away.

5. Clean any objects you touch a lot. Use disinfectant on objects like mobiles, laptops, keys, utensils, dish ware and door-knobs etc.
6. Avoid public gatherings, strict hygiene measures for the control of infection.
7. Health care personnel's must use personal protective masks like N95 masks, FFP3 masks, gowns, gloves etc.

Screening and quarantine [15]

1. One of the most significant undertaking is to screen the people originating from the endemic territories by checking their temperature, signs and manifestation of virus infection.
2. Furthermore, posing inquiries from them about their travel history and any sort of contact with the infected people.
3. There is another idea of collective screening of travelers going through aircrafts after leaving the endemic zones and showing up in some other city/nation. Despite the fact that this activity has still not been productive and there are odds of missing over half of the cases of COVID-19, explicitly the Ines who were demonstrating no side effects due to experiencing an incubation period.
4. In certain countries, isolate of effectively recognizable people wish signs and symptoms of COVID-19 was done strongly to prevent the further spread of the illness yet the mighty isolate may have ever enduring repercussions with psychosocial impacts.

Treatment [16,17]

Immediate mediated attention needed for COVID-19 patients with SOB or WOB, persistent pain or pressure in chest, New confusion or inability to arouse, bluish lips or face.

Drug targets: The therapies can be divided into 3 categories depending on their target.

1. Acting on the coronavirus directly by a) Inhibiting crucial viral enzyme b) Blocking viral entry to human cell.
2. Modulate the human immune system by a) Boosting the innate response, which has a particularly important role against viruses b) Inhibiting the inflammatory processes that cause lung injury.
3. Adjunctive therapy.

Ongoing clinical trails

Most of the agents under trial are repurposed for the current COVID-19. Concurrently, several trails were initiated to test the specific vaccines and antibodies specifically targeting SARS-CoV-2. As of April 2020-291 active clinical trailed found specific to COVID-19 of these 291 trails 109 trails included Pharmacological therapy for the treatment of COVID-19 in adult patients of these 109 trails 82 international studies and 27 Placebo's controlled trails.

S. No	Drugs	Under clinical trails and testing
1.	Interferons	Activate cytoplasmic enzymes affecting viral mRNA translation and protein synthesis
2.	Interleukin-2	It shows anti- inflammatory action
3.	Immunoglobulin	It contains non-specific antibodies it blocks viral Fc receptor activation by boosting endogenous neutralizing antibodies and preventing antibody- dependent enhancement of infection.
4.	Danoprevir	Hepatitis C virus NS3 protease inhibitor that to be used in combination with ritonavir
5.	Remdesivir	It is a nucleotide analogue which is use to treat Ebola and Marburg virus .it was also effective against SARSCoV-1 and MERS
6.	Favipiravir	Inhibitor of viral RNA dependent RNA polymerase which can be used in treating influenza and inhibiting polymerase of other viruses like Ebola, yellow fever

Table 4: Drugs and undergoing clinical trails and testing.

COVID-19 vaccine race

Now, Vaccines are not available in the market, but preparation of vaccine against COVID-19 is under process and it may take more than 10 months for the initial sample to get accessibility in the open market. The development of vaccine represented a more long term strategy to prevent COVID-19 outbreaks in the future. With the sequencing of SARS-CoV-2 genome, multiple nucleic acid-based vaccine candidate have been proposed. Mostly based on the S protein coding sequence.

1. **mRNA-1273**: Means Moderns m RNA-1273 is a synthetic strand of mRNA created by Massachusetts based US company. Expected to elicit antiviral response specifically towards the spike protein of SARS-CoV-2. Unlike conventional vaccine, does not require the virus. Therefore, it is relatively safe and ready to be tested. If mRNA-273 probes to be safe for humans and pass the phase- I trail, successive evaluation of its efficacy will be carried out immediately.

2. **INO-4800:** A DNA vaccine candidates created by Inovio pharmaceuticals, an US based company. Compared to conventional vaccine, genetic vaccine requires lower costs of production and easier way of purification. Currently is in Phase-I clinical testing in the US for COVID-19 and could potentially advance to Phase2/3 efficacy trails this summer.

3. **ChAdoX1nCoV-19**: Created by the university of Oxford composed of non-replicating adenovirus vector and the genetic sequence of the S protein of SARS-CoV-2. Entered phase1/2 clinical trails the non- relatively safe in children and individuals with underlying diseases if the vaccine is shown to be safe and effective in these earlier trails, vaccine manufacturing will be increases to allow larger studies to take place.

4. **BCG vaccine:** The Bacillus Calmette Guerin live attenuated vaccine candidate is in the phase 2/3 and is used against tuberculosis to boost the immune system. Clinical trails are being conducted to test the efficacy and safety of this vaccine candidate in protecting people again COVID-19 [18].

There are over a 100 vaccines being developed world wide and at least 30 clinical attempts in India. ICMR has already announced a research collaboration with Hyderabad based Bharat Biotech International Ltd (BBIL) to develop a COVID-19 vaccine. Moreover, the serum Institute of India (SII), which is the world's largest maker of vaccine by volume, has partnered with Oxford university to produce up to 60 million doses of potential vaccine.

The name of the Universities and research organization who are continuously doing research for to discover the cure for COVID-19 [14]:

1. GSK (Glaxosmithkline)
2. Novavax-Us based company
3. Altimune
4. Moderna-US biotech firm
5. Curevac- A German company
6. Imperial college- London
7. Inovio- Us biotech
8. Zydus Cadila
9. Vaxart
10. Vaxil bio.

Conclusion

The world is currently facing a health care crises in form of Novel COVID-19 prevention is truly crucial at the community level right now. We summarized and critically analyze all the published review and research articles regarding the COVID-19. This review aims to provide the better understanding about the evidence of early findings on the signs and symptoms, implementing the public health strategies like hygiene of people hands, using masks, isolating the positive patients. There are no promising clinical treatments still for treating the novel coronavirus. The researchers are still working to find efficient therapeutic plans for treating the novel coronavirus. This review studies provide information about future research related to this novel coronavirus and support for Pharmaceutical sectors and health emergency.

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