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Research Article

A Study on the Biological Mechanism of SARS-CoV-2, its Impacts and Adversities on the Human Body and Medications to Alleviate its Impacts

Rafa AY[1*], Luisetto M[2], Musa N[1], Arif OB[3], Ilman A[3], Haque T[3]

[1]Yugen Research Organization (YRO), Michigan, USA; [2]Department of Natural Science and Toxicology, IMA Academy, Milan, Italy; [3]Department of Science, Dhaka Residential Model College, Dhaka, Bangladesh

ABSTRACT

The related several penetration and fusion processes of SARS-COV-2 are very outstanding to observe with some phylogenetic features and pathogenesis of this very respiratory viral disease from the perspective of virology and epidemiology. Furthermore, very interesting to look at is SARS-COV-2, the largest RNA consistent Coronavirus with a substantial classification, sometimes found symptomatic or sometimes asymptomatic. To understand better, some additional figures are included here. Surely that SARS-COV-2 has a very complicated life cycle and genetic make-up and plasma therapeutic action is one of the successful fighters with the assistance of antigen. The role of Receptor Binding Domain and primary hosts in the diffusion of this disease is eventually undeniable.

Keywords: SARS-COV-2; Pathogenesis; Genetic; Epidemiology; Medication; RNA; Genome

INTRODUCTION

Dr. Jonathan Dordick in these days mentions that SARS-COV-2 targets a cell with its protein and initially amplifies a DNA-Based trap that zaps the virus in the bloodstream. Dr. Christian Peters predicted that the entire world will have to see novel viruses from animal to human. Peters also analysed that it is very mandatory to view at both the antiviral components and anti-inflammatory features that several drugs may have [1].

MATERIALS AND METHODS

- Observation of the SARS-COV-2 genetic termination and pathogenesis activities, medication, represented through the vigor of research articles and prominent research paper-based news.
- How are the people having impact by this viral respiratory disease? And how are people with other complicated diseases facing the adversities and to what extent?
- Analysis on Biological Mechanism of SARS-COV-2 with its life cycle and discussion from the Epidemiology Perspective.
- A list of references has been referred based on the information collection from various research papers and articles.

RESULTS AND DISCUSSION

SARS-CoV-2 phylogenetic analysis and penetration in human body

Since the SARS-CoV-2 emerged from Hunan Sea-Food Market, China and bats, snakes, rabbits etc. had been sold there, there is a clue to the Bat as a primary host.SARS-CoV-2 is phylogenetically harmonious to Bat Coronavirus that is evolved after an analysis on it. Consequently, bats can be the primary host or reservoir. The intermediate source or host is still unknown. Moreover, diffusion has been befalling among humans. To better understand a transmission Figure 1 is given below:

Figure 1: SARS-CoV-2 transmission.

Professor Zhou mentioned that coronavirus, originated from bats, is meticulously like it. In addition, it has approximately 96.2% uniformity to the present human Coronavirus. A network has been created on the basis of similarity between human and bat Coronavirus. The 160 human SARS-COV-2 sequences constituted 100 contrary modes [2].

Correspondence to: Ahmed Yesvi Rafa, Yugen Research Organization (YRO), Michigan, USA, Tel: +393402479620; E-mail: ahmed.yesvi@gmail.com

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COV-2 creates the very respiratory illness, and by delivering the nucleic acid enclosed capsid into the host cell this virus is penetrated. SARS-COV-2 depends on the harmonization of their envelope with the cell membrane of the host. The Spike Glycoprotein arbitrates its entrance and is a primary definitive of cell tropism and pathogenesis. The very role player entree protein is ultimately accountable for developing the host's receptor binding cell as well as centricing the penetration of host and viral membranes. Consequently, after the diffusion from one infected cell to another makes the infected the whole human body [3].

SARS-CoV-2 phylogenetic analysis and penetration in Prone population and the greater victim of Coronavirus

The Coronavirus is a pathogen having one of the most effective and fastest way of spreading. Their high contamination level make them extremely lethal. Coughing and sneezing without covering the mouth can disperse droplets in to the air. Touching or shaking hands with a person who has the virus can pass the virus between individuals. Making contact with a surface or object that has the virus and then touching the nose, eyes, or mouth. Some animal coronaviruses, such as feline coronavirus (FCoV), may spread through contact with feces. However, it is unclear whether this also applies to human coronaviruses. The national institute of health (NIH) lists and categories some of the age groups that are more vulnerable as the target populous of SARS-CoV-2. These are,

- Young children
- People aged 65 years or older
- Women who are pregnant

Its greater risk as a respiratory disease and towards respiratory patients

Now, what makes CoV so contagious and powerful is its ability to mutate and adapt to its environment. It can replicate very quickly as it takes over and overrides the human cell and starts replicating its own RNA (Ribonucleic Acid).

The COVID 19 pandemic has become a major threat to humankind infecting millions world-wide. So far, we considered two main routes of infection: 1) direct contact with object that has virus on it, and 2) indirect contact-by inhaling droplets emitted through sneezes and cough.

A team of scientists and researchers led by Sami Asadi, explaining the role of aerosols in transmission of COVID 19 published in Aerosol Science and Technology journal. They described two possible mode of COVID 19 aerosols transmission;

- During a sneeze or a cough, "droplet sprays" of virus-laden respiratory tract fluid, typically greater than 5 µm in diameter, impact directly on a susceptible individual.
- Alternatively, a susceptible person can inhale microscopic aerosol particles consisting of the residual solid components of evaporated respiratory droplets, which are tiny enough (<5 µm) to remain airborne for hours.

In a recent study by the United State National Academy of Sciences, Engineering & Medicine, revealed a new way through which the virus spreads quickly along with the evidence of asymptomatic spread of the disease. The study states that not only sneezing, but also talking or even just breathing could result in the diffusion of tiny particles carrying the virus (Bioaerosol). The team explained that the virus can stay suspended in the air in the ultrafine mist that is produced when infected people exhale. They recommended wearing masks while going out in public places.

Another experimental study was also conducted at Toho University in Japan by the Japanese Association for Infectious Disease to find out the third mechanism of transmission of COVID-19 using laser beams and high sensitivity camera to trap droplets particle in the air during sneezing, loud conversation, and breathing. They claim a 3rd way of the spread of this virus, which is its transmission through micro-droplets. The micrometer particles which carry many viruses are very small particles (10 µm) releases during sneezing, loud conversation and heavy breathing drift in the air which might causes infection. However, the larger droplets (about 1 mm) in diameter quickly fall after sneezing. The given images in Figures 2a and 2b are the laser and computer generated images of the transmission through micro-droplets.

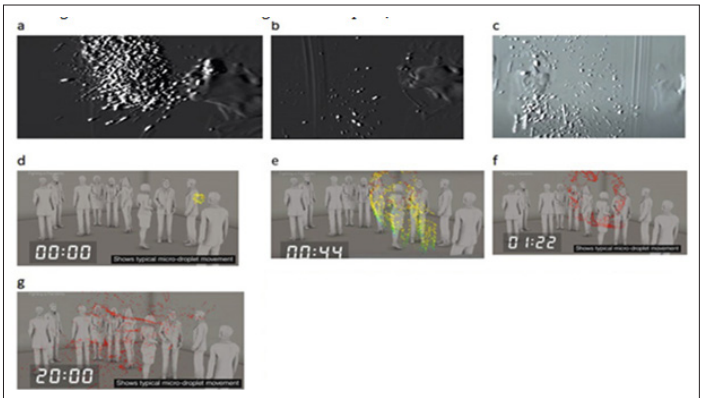

Figure 2: (a, b) Sneezing releases microdroplets drifting in the air, which might carry viruses. Experiment 2(c): Micro droplets during loud conversation and heavy breathing. Experiment 3(d, e, f, g): a person coughs once and spreads about 1000 macro droplets (green and blue) which fall down after 30 seconds and micro droplets (red) drift inside the closed room even after 20 mins [4].

And again, when patients are combined with basic diseases such as diabetes and hypertension, the body is in a state of stress for a long time and the immunity tends to be low. Moreover, the long-term history of diabetes and hypertension will damage the vascular structure, and it is more likely to develop into critical disease in infection. Patients with chronic heart disease are more likely to be infected due to their weakened heart function and low immunity. When infected with SARS-CoV-2, they are more likely to have acute cardiovascular events and develop into severe diseases. When the patient has previous respiratory diseases such as chronic obstructive pulmonary disease, the patient's lung function is damaged. They have lower resistance to the virus and are prone to developing ARDS. Thus, underlying diseases such as diabetes, hypertension, cardiovascular disease, or respiratory disease are risk factors for disease progression. This is consistent with the analytical results in this paper.

SARS-Cov-2 classification and genomic variation and discussion on RBD and ACE2 receptor

Beta Coronavirus has been analyzed in the SARS-CoV-2 and ACE2 is used as its host receptor. The very common symptoms considering the entry of it in human cells are chronic pneumonia, diarrhoea, shortness of breath [4]. Because of containing approximately the same sequences to SARS-CoV, SARS-CoV-2 is diffused with extremely transmission chain like that very epidemic disease.

Spike Glycoprotein of SARS-CoV-2 is a medium of penetration into body cells. By the obstruction to the receptor binding domain, the very role-player Glycoprotein entries into the cell of the host. Therefore to the development of viral infiltrates vanquisher, the Glycoprotein mainly acts against [5].

Patients with diabetic, who are medicated with ACE2 Vanquishers and ARB2, have been facing the ample increase of the expression of ACE2 that helps the virus to be infiltrated and infected. Consequently, people of having cardiac illness, uses the ACE2 increase drug for the betterment of their health, that is why, human health is in a great threat since it assists SARS-CoV-2 to be developed.

After the entrance into the human host cell of the SARS-CoV-2, its next target is to reduce the activities of antibodies. It uses mainly ACE2 to traverse the threshold cells and infection becomes harder gradually [6] (Figure 3).

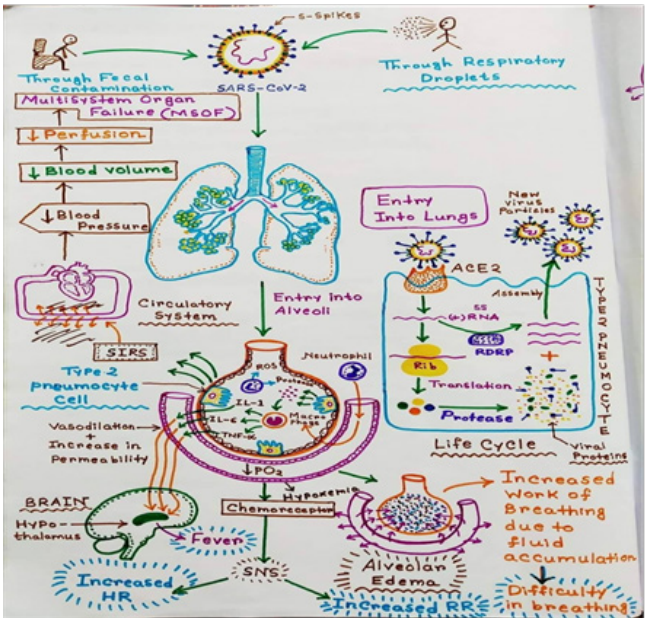

Figure 3: Represents the life cycle and evolutionary activities of SARS-CoV-2 after the penetration of the novel virus into the human body and other impacts.

A lab study on SARS-CoV-2 by Dr. Liji Thomas found that it had acted with approximately 700 mutations. In it, it had been found that 39 were non synonymous mutations with the holding of about 20 genome [7-9].

SARS-COV-2, a part of 'Ortho Corona Virinae' or 'Coronaviridae', comprises the realm 'Ribovirus', phylum 'IncertaeSedis', order 'Nidovirales', family 'Coronaviridae' as well as subfamily 'Ortho Coronaviridae'.Like every virus under the order of Nidovirales, this one is also constituted with the uncommon feature and make up as like as the others.The genome shape of its latitudes from nigh 26.4-31.7 kilobases, approximately 32 kilobases [10].

The replicase genome with the non-structural protein is constructed with 20 kilobases and in case of structural attendant protein, it is constructed with 10 kilobases, overall, with the other constitutional materials, its size is made nigh 32 kilobases [11].

Characterization and varies of different age including hunt on human body with symptoms

It is known that there is much probability of mortality and morbidity of this very respiratory disease that infects the lungs mainly. The breath in viral disease SARS-COV-2 approximately binds to the nasal activity. In the very asymptomatic case period, SARS-COV-2 infects the primary cells in a cellular human body slowly during 1-2 days infection period. As a single cell of RNA Genome represents a low level of ACE2 Receptor, there is indeed a propagation of the virus that lessens a limited measure of immunity strength. Case becomes severe when after a few days have passed. Consequently, SARS-COV-2 propagates down as a respiratory tract. As a consequence, a greatly immune system is triggered. The stages and probability of morbidity and mortality rates become high when Asymptomatic Case. For this cause, severe pneumonia and other impacts can be faced [12].

The very pandemic disease diffusion with its impacts and adversities have been under the analyses of International Centers for Disease Control and Prevention in order to cut the chain of human transmission and providing medication [13].

The common symptoms have included headaches, sore throat, and rhinorrhea. In addition to respiratory symptoms, gastrointestinal symptoms have also been reported [14].

Pneumonia appears to be the most frequent serious manifestation of infection with the coughing, fever, pain in chest; these kinds of symptoms [15].

SARS-CoV-2 is a great threat for adults as they generally suffer from various illnesses because of getting old age. And then, they often come to the contact of the infected person for anyhow, for any need related with regular or social works. Except children, people of all ages anyhow can be gotten contacted by any infected person. And then they could be in touch with children. On the other hand, several little-aged children have no sense of social distance and cleanliness. That is why people of all ages have any or any clue to be infected [16].

Evolutionary ability of coronaviruses

Coronaviruses also have another risk for the human population through their interspecies transmitting capacity. This is suspected for the HCoV OC43 that may have evolved from the bovine coronavirus, which caused gastrointestinal infections in cattle. Similarly, the SARS-CoV is a zoonotic virus that crossed the species barrier. Phylogenetic analysis of SARS-CoV isolates from animals and humans strongly suggest that the virus originated from animals, most likely bats, was amplified in palm civets, and transmitted to the human population *via* live animal markets. This potency of coronaviruses may be responsible for new disastrous outbreaks and therefore should be careful of.

Rabenau, et al. acquired a study using suspension tests with different organic substances (albumin, FCS, or sheep erythrocytes) and followed the recommendations of the European Standard. Most of the tested alcoholic-based solutions (isopropanol or ethanol) have been shown to allow a reduction>4 log10 in viral titers over 30 sec, whatever the added organic load. They also investigated the activities of three surface and instrument disinfectants (one based on benzalkonium chloride and laurylamine; one based on benzalkonium chloride, glutaraldehyde, and didecyldimonium chloride; and one based on magnesium monoperoxyphthalate). Contact times were then still in accordance to the European Standard, 30 and 60 min. SARS-CoV was inactivated by all the disinfectants to below the limit of detection (the smaller reduction

factor was 3.25 log10), regardless of the type of organic load. The same team pursued its investigation evaluating the SARS-CoV virucidal activity of different disinfectants based on alcohols (propanol, ethanol used for hands disinfection), aldehydes (formaldehyde, glutaraldehyde), glucoprotamin, and wine vinegar. The methodology was the same that previously described, except for the organic load, which was FCS. In case of cytotoxic effect after the dilution neutralization step, the virus-disinfectant mixture was membrane filtered. This allowed the concentration of the viral particles, which could then be tittered, while retaining the disinfectant.

This study revealed first that there were some behavioral differences between the viruses chosen as surrogates. This raises the question of the pertinence of surrogates use. However, SARS CoV is a virus which requires a level 3 containment laboratory. Therefore, virus surrogates allow laboratories, which do not dispose of this type of equipment, to conduct studies and produce precious data without working on a virus, which had already caused a worldwide epidemic [17].

Another important point revealed by this study is the inefficiency of bleach, a widely used disinfectant, when applied at the 1:100 (0.06%) use dilution prescribed by the manufacturer. Sattar, et al. has found higher reductions of HCoV 229E viral titers with concentrations of hypochlorite greater than the one tested here. These results are then consistent with a concentration-dependent effect [18].

The step that plays the key role in this methodology is neutralization. Many ways are there to achieve neutralization. The first one is dilution. Methodically, it does an immediate arrest of the activity of the tested product in the *vitro* and the destruction of its cytotoxicity. But, it needs very high titers to spectate the reduction of viral titers. In contrast, the cytotoxicity is not deducted thoroughly, making impossible the titration of the virus. The second one is chemical neutralization. It associates chemical inactivation and dilution of the tested product and its cytotoxicity. The third one is gel filtration method. It absorbs the antiseptic disinfectant molecules, and releases viral particles, which could then be tittered. But, the contact time may be longer which will lead to an overestimation of the product's activity. Indeed, to reflect the real activity of the product in the field, a precise contact time is required [17].

Virucidal activity against SARS-CoV-2

Virucidal activities on SARS-CoV-2 of different hand rub formulations and surface disinfectants have shown great results to prevent contamination and reduce risks of transmission.

Several alcohols have been proven to be useful. Ethyl alcohol (ethanol, alcohol), Isopropyl alcohol (isopropanol, propanol-2-ol), and n-propanol are the most widely used. Normally, the antimicrobial activity of alcohols is significantly lower at concentrations below 50% and is optimal in the 60 to 90% range.

Formaldehyde is an extremely reactive chemical that interacts with proteins, DNA, and RNA in *vitro*.

The most widely used biocide in antiseptic products, particularly in hand washing and oral products but also as a disinfectant and preservative is Chlorhexidine. It is because of its broad-spectrum effectiveness, substantivity for the skin, and low irritation.

Great reviews that deal with the chemical, physical, and microbiological properties of chlorine-releasing agents (CRAs) are available. Sodium hypochlorite, chlorine dioxide, and N-chloro compounds such as sodium dichloroisocyanurate (NaDCC), with chloramine-T are the most important types of CRAs. Sodium hypochlorite solutions are widely used for surface disinfection (household bleach) and can also be used for disinfecting spillages of blood containing human immunodeficiency virus [19].

A common agent as a preservative in cosmetics or as an antimicrobial agent in soap is Chloroxylenol. The antimicrobial effect of chloroxylenol is praiseworthy for its capability to deactivate alter cell wall synthesis and enzyme systems in microorganisms [20].

Iodine is a very effective virucidal, bactericidal, tuberculocidal, fungicidal, and sporicidal. They are associated with irritation and excessive staining, though aqueous or alcoholic (tincture) solutions of iodine have been used for 150 years as antiseptics.

Hydrogen peroxide (H_2O_2) is a popular biocide for disinfection, sterilization, and antisepsis. It is a clear, colorless liquid that is available in a variety of concentrations ranging from 3% to 90%. H_2O_2 is considered environment-friendly, because it can rapidly degrade into the innocuous products water and oxygen. H2O2 demonstrates high-level effectiveness against viruses, bacteria, yeasts, and bacterial spores [19].

Coronaviruses also survive in suspension. At 37°C, HCoV 229E and OC43 showed survival rates of 80% and 100%, respectively, in phosphate-buffered saline (PBS) over three days and of 30% and 55%, respectively, over six days. These survival rates fell to 50% for HCoV 229E and 30% for HCoV OC43 after three days in culture medium and after ten days, they were 0% and 10% for each virus, respectively. The same study also showed that desiccation has a severe effect on coronaviruses. Indeed, in standard environmental conditions (21°C and 50% to 70% of relative humidity), HCoV 229E infectivity came down to 30% after 3 hours of desiccation on various surfaces that can be found in hospital settings, such as aluminum, sterile sponges or surgical latex gloves. HCoV OC43 was more sensitive to desiccation, since its infectivity was below the detectable threshold after three hours of drying [17].

Rabenau, et al. made a comparative study on the stability of different viruses, i.e. SARS-CoV, HCoV 229E, type 1-herpes simplex virus (HSV-1) and type 3-adenovirus, in suspension and after drying. In medium culture, with and without 10% FCS, the HCoV 229E progressively lost its infectivity over nine days, which is the same as the previous study. The infectious titers of the three other viruses, including the SARS-CoV, were stable over nine days, with and without proteins. After drying on a plastic surface, the HCoV 229E and the HSV-1 lost their infectivity in 72 hours in the presence or absence of FCS. In contrast, the SARS-CoV retained its infectivity for as long as six days, with a further protecting effect of proteins. It took nine days in a dried state, for SARS-CoV to completely lose its infectivity. The adenovirus was the most stable virus tested as it conserved its infectivity throughout the nine days of the experiment [21].

Some other studies confirm these results. It is seen that SARS-CoV decreases its infectivity only after 72 to 96 hours. However, it is more effective on porous substances, such as cotton or paper.

RNA of SARS-CoV-2 was found on different environment samples, such as chair, elevator, computer mouse, etc., which may have contributed to contamination of health-care workers who had not been in direct contact with SARS-patients.

A more recent study implicated water and sewage in the transmission of SARS-CoV-2, taking the MHV and TGEV as surrogates for their experiments. At 25°C, the time required for 99% reduction in water was 22 days for TGEV and 17 days for MHV, and, in sewage, it took 9 days for TGEV and 7 days for MHV. After 4 weeks in almost the same conditions but at 4°C, there was less than <1 log10 infectivity decrease for both viruses. The authors concluded that in case of SARS-CoV re-emergence water contaminated with fecal waste should be considered as a potential vehicle of transmission [22].

These studies firmly evaluated the potency of coronaviruses and especially SARS-CoV-2, to be transmitted *via* other routes than respiratory droplets and the likely risk of contamination *via* surfaces and feces [21].

Vaccines, therapeutics and drugs

Till now no treatment or vaccine is available against HCoVs infections. In the case of SARS-CoV, various approaches were tried during the pandemic, but none was successful. Treatment was symptomatic and depended on the severity of the illness. Since then, studies have been conducted to identify potent anti-SARS-CoV treatment. The development of strategies with monoclonal antibodies, siRNAs or molecules such as glycyrrhizin or nelfinavirhave been conducted *in vitro* but still need to be improved. The emergence of SARS-CoV has also led to the development of new vaccine strategies, including expression of SARS-CoV spike protein in other viruses, inactivated SARS-CoV particles or DNA vaccines. However, an early concern for application of a SARS-CoV vaccine was the experience with animal coronavirus vaccines, which induced enhanced disease and immunopathology in animals when challenged with infectious viruses. Indeed, a similar immune-pathologic reaction has been described in mice vaccinated with a SARS-CoV vaccine and subsequently challenged with SARS-CoV. Thus, safety concerns related to effectiveness and safety for vaccinated persons, especially if exposed to other coronaviruses, should be carefully examined [23].

An important observation is that "immunopathology" as seen in experimental animals gives different vaccine formulations, appears to be quantitatively similar, although qualitatively dissimilar based on whether or not eosinophils predominate in the lungs. Although the adjuvant factor alum has been implicated in eosinophilic immunopathology, in fact this complication is seen with coronavirus vaccines both with and without alum; moreover, addition of alum appears to actually protect from eosinophilic lung pathology [24].

According to the WHO, Centers for Disease Control and Prevention (CDC) and the US Food and Drug Administration (FDA), there is no medicine or vaccine that is useful in the prevention or treatment of COVID-19 till now. Many pre-existing drugs used for treatment for SARS, MERS, HIV and malaria are being tested for the medicine against COVID-19 and are trailed in clinical trials. Chloroquine, hydroxychloroquine, lopinavir/ritonavir, and remdisivir are recommended in critical patients by CDC and Chinese treatment guidelines for COVID-19. If treatment with first-line drugs is ineffective, the use of other drugs reported in different studies may be considered. No certain information is available from large randomized clinical trials (RCTs) to provide guidance for the use, effectiveness, safety and adverse effects on the patients about any of the drugs for the treatment of COVID-19. Therefore, an action at the global level is required for more clinical trials and large controlled studies to evaluate the effective role and adverse effects of all the potential drugs [25].

Primary and Intermediate hosts in the transmission

Human Coronavirus infection is a zoonosis and understanding the origins of HCoVs would serve us well. Most HCoVs originated from bats. The intermediate reservoir hosts of some HCoVs are also known. Identifying the animal hosts has direct implications in the prevention of human diseases. Investigating Coronavirus-host transmission in animals might also derive important insight on Coronavirus pathogenesis in humans.

A study on diseased pangolins identified viral contigs from lung samples which has similarity with SARS-CoV-2. Assembly methods and manual curation were used in the study to get a part of the genome sequence of about 86.3% of the full viral genome [26].

SARS-CoV-2 shares 96.2% nucleotide homology with a bat CoV RaTG13 isolated from Rhinolophusaffinis bats. As in the cases of SARS-CoV and MERS-CoV, the sequence divergence between SARS-CoV-2 and RaTG13 is too great to assign parental relationship. That is to say, bats might not be the immediate reservoir host(s) of SARS-CoV-2 unless almost identical bat CoVs are found in future. The intermediate animal hosts of SARS-CoV-2 should be among the wildlife species sold and killed at the Huanan Seafood Wholesale Market, with which many of the initial cases of COVID-19 were associated, indicative of a possibility of animal-to-human transmission event. Many recent studies based on metagenomic sequencing have suggested that a group of endangered small mammals known as pangolins (Manisjavanica) could also transmit beta-CoVs related to SARS-CoV-2.

Pangolin beta-CoVs are highly pathogenic in pangolin. They might be an intermediate host for SARS-CoV-2-related beta-CoVs, similar to civet in the case of SARS-CoV. Firstly, bats could be the reservoir host. Through butchering or coal mining, humans might have shared the ecological niche with bats. Secondly, pangolins could be one of the intermediate hosts to which a SARS-CoV-2-related virus had been newly introduced. Humans contract the virus through butchering and consumption of meat. It is suspectible that many mammals, including domestic animals, could transmit SARS-CoV-2. A study on domestic and wild animals for antibodies is warranted. Thirdly, as mentioned above, adaptation of SARS-CoV-2 might have occurred in a third species that has contact with both bats and pangolins. The search for the zoonotic origins of SARS-CoV-2 is still on.

Although scientists are not sure and there are several pieces of the puzzle of zoonotic origin of SARS-CoV-2 still missing, it is found that bats may be the host determinants of transmission. Therefore, continued investigation in this area will evaluate the evolutionary ability of SARS-CoV-2 in species transmission, with important implications in the prevention and control of COVID-19 in humans [27].

The survival of coronavirus in biological fluids and its usage in treating COVID-19

Transfusion of convalescent blood products (CBP), especially convalescent plasma (CP), are useful against emerging infectious agents if the latter induces neutralizing antibodies. CBPs are manufactured by sampling whole blood or apheresis plasma from a convalescent donor [28].

Convalescent whole blood (CWB), in addition to antibodies, provides control of hemorrhaDonor selection should be based according to neutralizing antibody titers as assessed with the plaque reduction neutralization test (PRNT), which requires a viable isolate, replication-competent cell lines and skilled personnel. Since PRNT takes time to be setup and requires expensive facilities, in resource-poor settings or in time-sensitive scenarios, collection with retrospective PRNT or ELISA assays targeting recombinant receptor binding domains (RBD) of the viral anti-receptor has often been implemented : Under these circumstances ELISA ratio/indexes have shown very high correlation with PRNT titres [28]. Magic events, as in Ebola Virus disease, if transfusion occurs within 24 hours to keep viable platelets and clotting factors. Nevertheless, convalescent plasma (CP) best fits developed countries, standards, and settings where antibodies are only required. CP should be collected by apheresis to ensure larger volumes, more frequent donations, and do not cause unnecessary anemia in the donor [28].

Although neither the US Food and Drug Agency (FDA) nor the European Center for Disease Control are recommending pathogen reduction technologies (PRT) for CP in several settings, donor screening and conventional NAT viral testing (i.e., HIV, HCV and HBV NAT) could not be enough to ensure CP safety. Several technologies have been approved and are currently marketed. Solvent/detergent (S/D)-filtered plasma provides quick>4 log inactivation of most enveloped viruses: although the technology was developed and is massively used for large plasma pools, small-scale reduction has been reported. The technology relies over 1% tri (n-butyl) phosphate/1% Triton X-45, elimination of solvent and detergent *via* oil extraction and filtration, and finally sterile filtration. Filtration across 75-35 nm hollow fibers could remove large viruses while preserving IgG, but has not been implemented yet [28].

In recent years photo-inactivation in the presence of a photosensitizer has become the standard for single unit inactivation: approved technologies include combination of methylene blue+visible light (Theraflex®), amotosalen (S-59)+ultraviolet A (Intercept®) and riboflavin+ ultraviolet B (Mirasol®). These methods do not affect immunoglobulin activity.

Fatty acids are also an option. In 2002, it was reported that caprylic acid and octanoic acid were as effective as S/D at inactivating enveloped viruses. Heat treatment of plasma has been used in the past but goes with the risk of aggregation of immunoglobulins.

As soon as the COVID-19 pandemic appeared, several authors suggested CP as a potential therapeutic. Of interest, the most critically ill patients show prolonged viremia (strongly correlated with serum IL-6 levels), which leaves room for therapeutic intervention with antivirals and immunoglobulins even in late stages. Viral shedding in survivors can be as long as 37 days, mandating SARS-CoV2 RNA screening in CP donors. The appearance of serum IgMand IgA antibodies in COVID-19 occurs since day 5 after symptom onset, while IgG is detected since day 14. IgG are universally detected since day 20. Severe female patients generate IgG earlier and higher titers. The duration of anti-SARS-CoV2 antibodies in plasma remains unknown, though for other beta coronaviruses immunity typically lasts 6-12 months. Therefore a suitable donor could donate 600 ml plasma (equivalent to 3 therapeutic doses) every 14 days for a minimum of 6 months. In contrast to EVD, SARS, and MERS, most COVID-19 patients exhibit few or no symptoms and do not require hospitalization, suggesting that the majority of convalescent donors are best sought after in the general population [28].

In a first case series from China, 5 patients under mechanical ventilation (4 of 5 with no preexisting medical conditions) received transfusion with CP with a ELISA IgG titer>1:1000 and a neutralization titer>40 at days 10-22 after admission. Four patients recovered from ARDS and 3 were weaned from mechanical ventilation within 2 weeks of treatment, the remaining being stable [29].

Another Chinese pilot study (ChiCTR2000030046) on 10 critically ill patients showed that one dose of 200 mL CP with neutralizing antibody titers>1:640 resulted in an undetectable viral load (70%), radiological and clinical improvement. A third series of 6 cases with COVID-19 pneumonia in Wuhan showed that a single 200 ml dose of CP (titrated by CLIA only) administered at a late stage led to viral clearance in 2 patients and radiological resolution in 5. Two cases with ARDS and mechanical ventilation were also successfully treated with 2 250-ml CP doses (titrated with ELISA only) in South Korea [28,29].

As previously proven, donor testing for neutralizing antibodies is mandatory in upstream donor selection. Three approaches are theoretically available to recruit CP donors, everyone having pros and cons. The least cost-effective approach is screening the general periodic donor population for the presence of anti-SARS-CoV2 antibodies. In endemic areas, this strategy provides many fit donors with the additional benefit of a sero prevalence study in the general population (80% of cases being asymptomatic), but requires a high budget. On the other side of the coin, recruitment of hospital discharged patients are highly cost-effective (patients can be easily tested before discharge and tracked), but patients who have required hospitalization 10 are highly likely to be elderlies with comorbidities, and hence unfit to donate. The intermediate approach is deploying calls to donate to positive cases under home-based quarantine: given the large numbers, some of them are likely to be periodic donors, and home-based convalescence suggests they are fit enough to donate. Nevertheless, lessons from MERS suggest that patients with mild symptoms could have developed low-titer antibodies, making antibody titration even more important in the population-wide and home-based approaches [28].

Coronavirus types

The expression "coronavirus" alludes to an enormous gathering of infections known to influence flying creatures and vertebrates, including people, COVID-19, which originally showed up in China in December 2019, is a kind of coronavirus.

Coronaviruses are named for the spiky projections on their surface. These take after the focuses on a crown. Crown signifies "crown" in Latin.

There are several coronaviruses, yet just seven are known to influence individuals. Four human coronaviruses just motivation mellow cold or influenza like side effects. Three different coronaviruses present progressively genuine dangers [30].

The Coronavirus has a place with the family Coronaviridae. The family Coronaviridae contains two subfamilies, the Coronaviridae and the Torovirinae. True to form, toroviruses share numerous qualities with different individuals from the family Coronaviridae, including fundamental virion design, genome association, and

system for orchestrating a 3′-settled arrangement of mRNAs. Torovirus particles are round, pleomorphic, wrapped infections around 120–140 nm in distance across with evident surface spike proteins [31].

Coronaviruses (and toroviruses) are grouped together based on the crown or radiance like appearance of the envelope glycoproteins, and on trademark highlights of science and replication. Most human coronaviruses can be categorized as one of two serotypes: OC43-like and 229E-like [32].

Coronavirus life cycle steps

Coronaviruses are inconsistently raising infections answerable for SARS and MERS malady flare-ups. Notwithstanding, a few phases in the infection life cycle are promising focuses for restorative intercession. Cell passage is interceded by the huge glycoprotein spike, which ties to have receptors and intervenes combination of the viral and host layers. The capacity of coronaviruses to adjust to new species or getaway from the insusceptible framework is ascribed to the viral spike protein. Once inside the cell, the viral RNA amalgamation complex is collected from 16 nonstructural proteins (NSP), which interpret, alter, and change viral RNAs and redesign ER films to make RNA replication manufacturing plants. Articulation of the viral auxiliary proteins includes the RNA amalgamation complex completing irregular strand combination to deliver a settled arrangement of viral mRNAs with truncations of the 5' open understanding casings. Intermittent strand union is fundamental for the creation of new virions and understanding its systems will reveal insight into related viral procedures, for example, viral recombination to produce spike variations with adjusted serotypes or host tropisms. During the K99 stage I will acquire preparing in cryo-electron microscopy to supplement my aptitude in X-beam crystallography. I will utilize cryo-electron microscopy to look at the unmistakable adaptations of the coronavirus spikes protein as it ties have receptors and is prepared for the combination procedure by have proteases as I change to the R00 period of the honor. These examinations expand on the ongoing structure assurance of the HKU1-CoV spike protein from Dr. Andrew Ward's research center to which I contributed. In addition to the fact that this spikes structure exhibit the achievability of the proposed tests, yet in addition gives a premise to new theories of spike protein work.

Likewise during the K99 stage, I will use the skill of Dr. Erica Saphire's research facility to create RNA helicase tests to evaluate the capacity of the viral NSP13 helicase. I will utilize these measures to give robotic biochemical proof to distinguish RNA layouts whereupon the NSP13 helicase slows down and may prompt enlistment of the RNA blend complex to do the intermittent strand combination. During the R00 stage, I will supplement these investigations with organic chemistry, X-beam crystallography, and cryo-electron microscopy to distinguish the sub-atomic instruments by which NSP13 perceives RNA substrates and speaks with the RNA combination complex [33].

The development of resistance capacity of the human body against coronavirus

It isn't carefully evident that no one who hasn't just had COVID-19 has insusceptibility to the ailment. We do have some limit in our bodies to ensure ourselves. In addition, our safe frameworks can get the hang of during the contamination and clear the infection from our body [34].

As an antiviral component, antigen Introducing Cells (APC) are associated with the introduction of viral antigenic peptides complexed with MHC (significant histocompatibility complex) class I and class II atoms to CD8 and CD4 White blood cells. The choice of peptides and introduction procedures of the host prompts a superior comprehension of cell invulnerability and antibody headway. During any popular disease, DCs (dendritic cells) assume a basic job as an APC. DCs are a linkage among intrinsic and versatile invulnerability [35].

Effects and impacts of various medications in treating coronavirus

At present, there is no antibody or antiviral treatment for human and creature coronavirus, so that recognizing the medication treatment alternatives as quickly as time permits is basic for the reaction to the 2019-nCoV flare-up. Three general techniques, which incorporate existing wide range antiviral medications utilizing standard measures, screening of a concoction library containing many existing mixes or databases, and the redevelopment of new explicit medications dependent on the genome and biophysical comprehension of individual coronaviruses, are utilized to find the possible antiviral treatment of human pathogen coronavirus [36].

The prescriptions utilized routinely and tentatively in the treatment of COVID-19 patients cause symptoms, anyway their advantages exceed the burdens. As a result of exceptional pharmacotherapy, a few patients significantly after full recuperation from COVID-10 may experience the ill effects of dental/oral issues related with delicate tissues, salivation creation, neurological-based oral sensations, and so on. As explicit pharmacological treatment for COVID-19 is as yet unclear, the World Wellbeing Association as of late started SOLIDARITY preliminary to approve different meds for possible treatment of extreme COVID-19 confusions [37].

The new exploration offers consoling proof to countless individuals with hypertension that mainstream antihypertensive medications don't put them at more serious hazard from Covid-19 as certain specialists had dreaded.

Two circulatory strain bringing down medication classes, called Expert inhibitors and ARBs, went under investigation after the US Habitats for Ailment Control and Avoidance detailed in April that 72% of hospitalized Covid-19 patients 65 or more seasoned had hypertension [38-40].

Chloroquine and hydroxychloroquine are known to conceivably cause heart beat issues, and these could be exacerbated if treatment is joined with different drugs, for example, the antimicrobial azithromycin, that effectively affect the heart.

Late examinations have announced genuine, sometimes lethal, heart mood issues with chloroquine or hydroxychloroquine, especially when taken at high dosages or in blend with the anti-infection azithromycin [41-44].

CONCLUSION

SARS-CoV-2, a novel contagious viral disease, which has firstly emerged in China's Hunan Sea-Food Market. This respiratory disease causes chronic pneumonia and consequently there is shortness of breath and impacts are found in blood and human body organs failure. Phylogenetically analysis revealed that bats have the same virus which has infected the human body and no intermediate host thereby. Currently, plasma therapy, as a biological

fluid is being used as a reliable medication and no vaccines are in use. And it's one of the largest RNA virus that has a great life cycle. Plasma therapy, while being used to mitigate its effects, some other preventive and counteracting measures are also playing a vital role in working as a primary line of defence.

Many types of Zoonotic Coronaviruses are all around the world. Mostly, bat-Coronaviruses with zoonotic potential have so much diversity. These Coronaviruses might evolve and combine together turning into a global emergence in the future. By abandoning the culture of eating the meat of suspected animals, the possibilities of animal-to-human transmission can be deducted. To conclude, the best preventive measure is to stay away from natural reservoirs of dangerous viruses.

CONFLICT OF INTEREST

The author declares no conflict of interest in every sphere.

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