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A REVIEW ON THE BEGINNING, SPREADING AND TREATMENT OF CORONAVIRUS (COVID-19)

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Abstract - Wuhan, China was the first city of the glove where the coronavirus patients were found on 31 December in 2019.The SARS CoV-2 (n CoV) is a β-coronavirus, the coronavirus disease 2019 (COVID-19) has spread throughout from China to other developed and developing continents. Sequencing results and evolutionary analysis, bat has been suspected as natural host of virus origin, and SARS CoV- 2 might be transmitted from bats. Human-to-human transmission of SARS-CoV-2 occurs. The size of SARS –CoV-2 is about 29.9 Kb lengths, SARS-CoV is 27.9 Kb and MERS-CoV is 30.1 kb, both have positive sense RNA genomes. Basic symptoms are seen in the patients like fever, malaise and dry cough and other respiratory failure, gastrointestinal symptoms, diarrhea, vomiting, fatigue. Diagnosis by RT- PCR (Reverse Transcriptase- Polymerase chain reaction) or Real time PCR. Remdesivir and Chloroquine drug with great potential to treat COVID-19. In Korea significantly decreased after lopinavir/ritonavir used. China including lopinavir/ritonavir, arbidol, used and gained significant improvement. The other antiviral drugs include nitazoxanide, favipiravir, nafamostat.

Keywords: COVID -19/ SARS CoV-2, Beginning, Spreading, Symptoms, Treatments, remdesivir, nitazoxanide, favipiravir, nafamostat.

I. INTRODUCTION

Wuhan, China was the first city of glove where a lots of pneumonia cases found. After examination, doctor's cleared that patients caused by a newly identified coronavirus on 31December 2019. This coronavirus, was initially named as the 2019-novel coronavirus (2019-nCoV) on 12 January 2020 by World Health Organization (WHO). WHO officially named the disease as coronavirus disease 2019 (COVID-19) and Coronavirus Study Group (CSG) of the International Committee recommended name the new Coronavirus as SARS-CoV-2. The scientists of China quickly isolated a SARS-CoV-2 from a patient within a short period of time on 7 January 2020 and done sequencing of the genome of SARS-CoV-2 [1]. At present, as of 7 April 2020, a total of 1214466, cases of COVID-19 have been confirmed in all over World including 67767cases of death, time 05;30 GMT +5;30 [2]. In India a total confirmed cases is3981and 114 death cases. (ministry of health India) at 7 April 2020 9;00GMT=5;30.It is estimated the basic reproduction number (R0) of SARS-CoV-2 to be around 2.2 [3], or even more (range from 1.4 to 6.5) [4].The epidemic COVID-19 steadily spreading by human-to-human transmission but it is zoonotic.

Beginning and spreading of SARS-CoV-2

The SARS-CoV-2 is a β-coronavirus, which is enveloped non-segmented positive-sense RNA virus (subgenus sarbecovirus, Orthocoronavirinae subfamily) [5]. Coronaviruses (CoV) are classified into four categories, including α–/β–/γ–/δ-CoV, first two are able to infect mammals, while γ- and δ-CoV able to infect birds. The two known β-CoVs, SARS-CoV and MERS-CoV lead to severe and potentially fatal respiratory tract infections [6]. The genomic sequence reveled that SARS-CoV-2 is 96.2% identical to a bat CoV RaTG13, shares 79.5% identity to SARS-CoV. On the basis of sequencing results and evolutionary analysis, bat has been suspected as natural host of virus origin, and SARS CoV- 2 might be transmitted from bats via unknown intermediate hosts to infect humans. It is clear now

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that SARS-CoV-2 could use angiotensin-converting enzyme 2 (ACE2), the same receptor as SARS-CoV [7], to infect humans.

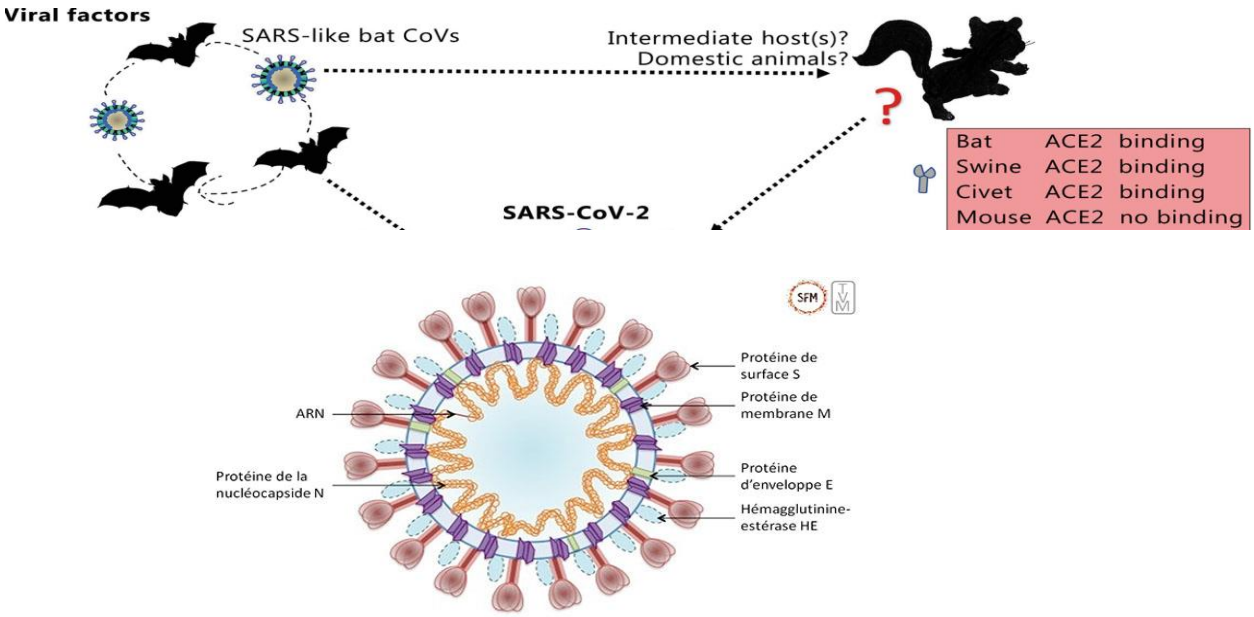

Figure:1 Origin of SARS-CoV-2

II. EPIDEMIOLOGY AND TRANSMISSION

The epidemic of unknown acute respiratory tract infection broke out first in Wuhan, China, since 12 December 2019, related to a seafood market. Several studies suggested that bat may be the primary reservoir of SARS-CoV-2 [8, 9]. However, the origin of SARS-CoV-2 was from the seafood market has no evidence till now. Rather, bats are the primary or natural reservoir of a wide variety of CoVs, including SARS-CoV-like and MERS CoV- like viruses [10–12]. The viral genome sequencing of new coronavirus (nCoV) was analyzed to Bat genome CoV RaTG13 and showed that 96.2% overall genome sequence is identical [7], suggesting that bat CoV and human SARS-CoV-2 might be same ancestor, although bats are not available for sale in this seafood market of China [13]. Besides, protein sequences alignment and phylogenetic analysis [14] showed that similar of receptors were observed in many species, which was of alternative intermediate hosts, such as pangolin, turtles and snacks.

Human-to-human transmission of SARS-CoV-2 occurs mainly between family members, including relatives and friends who contacted with patients or carriers peoples. It was found [15] that 31.3% of Peoples recent travelled to Wuhan, China and 72.3% of peoples contacting with patients from Wuhan among the patients of nonresidents of Wuhan. Transmission between healthcare workers such as doctors, nurses occurred in 3.8% of COVID-19 patients, issued by the National Health Commission of China on 14 February 2020. The transmission of SARS-CoV and MERS-CoV is reported to occur mainly through nosocomial transmission. Infections of healthcare workers in 33–42% of SARS cases and transmission between patients (62–79%) were the most common route of infection in MERS-CoV cases [16, 17]. Intermediate host animals or consumption of wild animals was suspected to be the main route of SARS-CoV-2 transmission. However, the sources, transmission routine(s) of SARS-CoV-2 remain unclear.

III. GENOMIC STRUCTURE OF nCoV

The size of SARS –CoV-2 is about 29.9 Kb lengths, SARS- CoV is 27.9 Kb and MERS- CoV is 30.1 kb, both have positive sense RNA genomes [18]. Mutation done on non structural protein, NSP2 and SARS CoV-2 had been mutated in different patients in China and it is smaller than H7N9 avian influenza. Basically Corona or COVID-19 is two type, L type (70%) and S type (30%).L type strain are derived

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from S type which is more aggressive and contagious. [19, 20]

IV. CLINICAL CHARACTERISTICS

Sars CoV -2 was isolated from fecal swabs of a severe pneumonia patients on 10 February 2020 from china [21]. The incubation period is 1-14 days (3-7 day). COVID -19 is highly transmitted to elderly with underlying disease (old man with suffer from any disease). The median age of patients is 47.9- 45.7% patients with female so the suffering from COVID -19, both gender are equally target. [22, 23]

V. SYMPTOMS

There are three basic symptoms are seen in the patients, fever, malaise and dry cough. Other Symptoms like respiratory failure, gastrointestinal symptoms, diarrhea, vomiting, fatigue, and sputum production, shortness of breath, sore throat and headache are also reported. Out of all these symptoms patient suffering from fever is about 88.7%, cough 67.8% and fatigue 38.1%. Fisrt two symptoms are dominated. [15]

VI. DIAGNOSIS OF SARS COV-2

The primarily identification of SARS- CoV-2 through classical Koch's postulates by observing its morphology through electron microscope [24]and most advance common diagnosis methods are molecular methods as RT- PCR (Reverse Transcriptase-Polymerase chain reaction) or Real time PCR, which are made using RNA from respiratory surface samples such as oropharyngeal swabs, or bronchoalveolar lavage and sputum.

Novel Coronavirus (nCoV) like SARS CoV and MERS CoV so the diagnosis procedure follows same SARS CoV and MERS CoV. Virology and genetic analysis studies have shown that bats are reservoir hosts of both SARS CoV and MERS CoV. Bat gene source of alpha CoV and beta CoV.

VII. TREATMENT AND PROTECTION

Given the lack of effective antiviral therapy against COVID-19, current treatments mainly focused on symptomatic and respiratory support according to the Diagnosis and Treatment of Pneumonia Caused by COVID-19 (updated to version 6) issued by National Health Commission of the People's Republic of China [25]. Nearly all patients accepted oxygen therapy, and WHO recommended extracorporeal membrane oxygenation (ECMO) to patients with refractory hypoxemia [26]. Rescue treatment with convalescent plasma and immunoglobulin G [27] are delivered to some critical cases according to their conditions.

VIII. ANTIVIRAL TREATMENTS

Based on the experience of fighting the epidemic SARSCoV and MERS-CoV previously, we may learn some lessons for some treatment strategies against coronavirus [28]. Antiviral drugs and systemic corticosteroid treatment commonly used in clinical practice previously, including neuraminidase inhibitors (oseltamivir, peramivir, zanamivir, etc), ganciclovir, acyclovir, and ribavirin, as well as methylprednisolone [29] for influenza virus, are invalid for COVID-19 and not recommended. Remdesivir is a 1′-cyano-substituted adenosine nucleotide analog prodrug and shows broad-spectrum antiviral activity against several RNA viruses. Based on the data collected from in vitro cell line and mouse model, remdesivir could interfere with the NSP12 polymerase even in the setting of intact ExoN proofreading activity [30]. Remdesivir has been reported to treat the first US case of COVID-19 successfully [31]. Chloroquine is a repurposed drug with great potential to treat COVID-19. Chloroquine has been used to treat malaria for many years [32], with a mechanism that is not well understood against some viral infections. Several possible mechanisms are investigated: Chloroquine can inhibit pH-dependent steps of the replication of several viruses [33], with a potent effect on SARS-CoV infection and spread [34]. Moreover, chloroquine has immunomodulatory effects, suppressing the production/release of TNF-α and IL-6. It also works as a novel class of autophagy inhibitor [35], which may interfere with viral infection and replication. Several studies have found that chloroquine interfered with the glycosylation of cellular receptors of SARS-CoV [34] and functioned at both entry and at post-entry stages of the COVID-19 infection in Vero E6 cells [36]. A combination of remdesivir and chloroquine was proven to effectively inhibit the recently emerged SARS-CoV-2 in vitro.

Scientists previously confirmed that the protease inhibitors lopinavir and ritonavir, used to treat infection with human immunodeficiency virus (HIV) [37], could improve the outcome of MERS-CoV [38] and SARSCoV [39] patients. It has reported that β-coronavirus viral loads of a COVID-19 patient in Korea significantly decreased after lopinavir/ritonavir (Kaletra®, AbbVie, North Chicago, IL, USA)

treatment [40]. Additionally, clinicians combined Chinese and Western medicine treatment including lopinavir/ritonavir (Kaletra®), arbidol, and Shufeng Jiedu Capsule (SFJDC, a traditional Chinese medicine) and gained significant improvement in pneumonia associated symptoms in Shanghai Public Health Clinical Center, China [41].The other antiviral drugs include nitazoxanide, favipiravir, nafamostat.

Many measures should be taken, such as timely publication of epidemic information for elimination of the source of infection, early diagnosis, reporting, isolation, supportive treatments and for avoiding unnecessary panic. CDC reminds basic measures such as hand washing, using disinfectant solutions, avoiding contact with patients in order to prevent the spread of viruses by droplets. Precautionary actions including the provision of medicines supply chains, personal protective equipment, and hospital supplies should be made in a short time for the protection of the Chinese people and global health, especially in the places with close travel ports to major Chinese ports.

Based on the 2003 SARS-CoV epidemic experience, the government takes many effective measures including closing public transport, reducing migration and promoting personal protection with masks in Wuhan and other provinces. Hence, there are reported cases of infected hospital personnel, healthcare staff should be informed about taking personal protective measures such as the use of gloves, eye masks and N95 masks during the examination of patients with a suspected history of COVID-19 contact or travel to China.

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