MINI-REVIEW

All about COVID-19 in brief

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A new coronavirus was discovered due to detection of an unfamiliar pneumonia in a group of patients in December 2019 in Wuhan, China, initially named as 2019 novel coronavirus (2019-nCoV) by the World Health Organization (WHO) on 7 January. Researchers sequenced the genome of new virus and figured out 86.9% of the genome is the same as SARS-CoV genome [1]. Afterwards the name was changed to Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2) [2]. According to coronavirus disease 2019 (COVID-19) Situation Report – 71 (Data as reported by 10:00 CET 31 March 2020) 750 890 cases were globally confirmed and 36 405 persons died [3]. International Committee on Taxonomy of Viruses (ICTV) recently classified 28 unique species into 4 genera: alpha-CoVs, beta-CoVs, gamma-CoVs and delta-CoVs. Mammals can be infected by alpha and beta whereas, gamma-CoVs and delta-CoVs are able to afflict birds and also humans [1,4]. 7 corona viruses responsible for respiratory complications in humans have been discovered so far (HCoVs). The new corona virus recently spread world-wide is considered a beta-CoVs genus. Before the outbreak of severe acute respiratory syndrome (SARS) in 2002, coronaviruses weren't regarded as highly pathogenic for human [1]. Phenotypic methods like culture, electron microscopy and serological studies are employed to recognize the virus, so coronaviruses were identified as pleomorphic, enveloped viruses containing crown-shaped peplomers with 80-160 nM in size and 27-32 kb positive polarity [4,5]. As a result of many researches carried out, the structure of coronavirus genome is properly known. There are four structural proteins: spike (S), envelope (E), membrane (M) and nucleocapsid (N). These proteins beside other helper proteins account for One-third of the genome, the other two-third encodes viral polymerase (RdRp), RNA synthesis materials and ORF1a-ORF1b (two types of huge nonstructural proteins) [4]. S protein is on the surface of the virus and shape the virus as a crown. S protein's function is making an interaction between the sensitized cell and the virus then the genome can enter the cell. In cytoplasm, genomic RNA encodes various structural and non-structural polypeptide genes. Shape of the virus is reforming along with alterations in S-protein-coding genes. The E and M types function as small transmembrane proteins. Nucleocapsid (N) is used for cloning and generation of recombinant proteins. CoVs extremely recombine which is the outcome of repetitively developing transcription errors and RNA Dependent RNA Polymerase (RdRP) jumps [4,5].

Transmission

The source infection of original cases was related to seafood wholesale market. Since there is similarity between the SARS-CoV-2 and Bat-CoV RaTG13 (a gene detected from a bat), researchers supposed that bat is an initial host. Following studies suggested pig or pangolin as a possible intermediate host. Animal repository of COVID-19 is probably snake [6]. It appears that the infection was first transmitted through zoonotic agents (from animal to human). Despite the sea food market being closed, rates of infected patients increased, which indicated human-to-human transmission.

Respiratory droplets (related to human respiratory activities such as talking, coughing and sneezing) and direct contact are the most probable transmission routes, but some cases show other ways of transmission like; fecal-oral transmission, fomite transmission (transfer of a virus via an object), perinatal (intrauterine) transmission. There have been few researches,

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some of which were negative. All routes are under investigation and some researchers believed that the limited samples affect the negative results [7].

No reliable study has been conducted on the survival of the coronaviruses in food to indicate foodborne transmission. Some microbicides are effective against coronaviruses; for example Alcohols, Aldehydes, Phenolics [8].

Clinical manifestations

It is essential to be aware of clinical manifestations of COVID-19, even though the symptoms are nonspecific. Common symptoms are fever, nonproductive cough and myalgia or fatigue, normal or decreased leukocyte counts and radiographic evidence of pneumonia. At first people may complain of diarrhea and nausea. A few days later, they develop fever. Fever is usually detected in patients but it is not the main symptom. Headache, dizziness, abdominal pain, diarrhea, nausea, and vomiting are some of the less common symptoms. ICU care is required for aged patients or patients likely to have comorbidities including hypertension, diabetes, cardiovascular diseases and cerebrovascular disorders. Subsequent problems during hospitalization are mostly acute respiratory syndrome (ARDS), arrhythmia, and shock. According to scientific observations, as the status of patient gets worse, urea and creatinine blood levels gradually rised [9,10]. Another common symptom in patients is lymphopenia that possibly is a serious issue during hospitalization so there may be correlation between lymphopenia and severity or mortality of the disease [11].

Diagnosis

The CORVID-19 is diagnosed based on asking questions about contacts and travel of the patient during past two weeks and accurate tests like molecular methods, serology and viral culture. RT-PCR (Real Time Polymerase Chain Reaction) is a molecular method that is commonly used for diagnosis. Lower respiratory tract samples are better than upper ones because they have higher viral load. The other methods have some defects: Antibody detection has the less sensitivity and viral culture take more time [9,10].

National health and health commission of china recommend Computed Tomography Scan (CT scan) as the main way for diagnosis because RT-PCR may have some errors in samples. Radiological tests are important for early detection of the disease. Chest CTs imaged of COVID-19 patients are broad-spectrum, but the regular chest CT results is bilateral distribution of patchy shadows and ground glass opacity (GGO) [9,10].

Treatment

Establishing a helpful antiviral agent against COVID-19 is urgently needed. A number of drugs have been claimed to be safe and efficient by randomized controlled trials; however, only two of which have been allowed by FDA so far: Chloroquine sulfate and Hydroxychloroquine sulfate [4,12,13]. The following is an overview of the drugs being used or undergoing trials at present.

After conducting numerous tests to determine the efficacy of Chloroquine sulfate (CQ) and Hydroxychloroquine sulfate (HCQ), they are currently used as first-line treatment drugs in most countries [14]. Chloroquine is an old drug used against malaria which is inexpensive and safe for elder patients [15]. According to studies, compared with CQ, HCQ has fewer side effects in long-term use, fewer drug-drug interactions and can be used in higher doses. It is possible that a combination of Hydroxychloroquine and Azithromycin may have a positive effect, especially in severe cases [14].

Despite the efficacy of these two drugs in the recovery process, there may be some side effects including gastrointestinal responses, risk of cardiac arrhythmias and risk of retinal damage; especially with long term use [16,17].

Remdesivir is a new antiviral agent being under examination which inhibits viral replication through premature termination of RNA transcription and is capable of affecting a wide range of RNA viruses [9]. Several clinical trials have indicated the efficiency of Remdesivir in the treatment procedure.

Other antiviral agents that inhibit the protease activity of coronavirus and HIV in vitro or animal model studies are Lopinavir (LPV) and Ribavirin (a guanosine analogue) [18]. No differences were observed during viral shedding after treatment with Kaletra (combined drug Lopinavir and Ritonavir). European Society of Intensive Care Medicine (ESICM) doesn't recommend routine use of Kaletra [19,20].

Corticosteroids inhibit immune responses and pathogen clearance in spite of suppressing lung inflammation. There is no evidence-based reason to consider corticosteroids helpful in the treatment process, rather, they are more likely to be harmful. Interim guidance from WHO on the clinical management of severe acute respiratory infection (released March 13, 2020) suggests against the use of corticosteroids when SARS-CoV-2 infection is suspected, except for exceptional circumstances, especially severe cases, which should be prescribed with care [18,21].

Some drugs are still under investigation such as anti-influenza drugs, Umifenovir, Oseltamivir, and the useful treatments for SARS and MERS (the other beta coronaviruses that spread two decades ago) [9,22]. Researchers are making great effort to find

efficient drugs using randomized control trials necessary before utilization [15].

The world-wide spread of COVID-19 has become a critical health issue. Nevertheless, more knowledge is yet to be acquired. Public health efforts are most needed to restrict the outbreak of the virus via human to human transfer, which seems to be the best approach in the current situation [7,23].

Conflict of interest

There is no conflict of interest.

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