

Covid 2019 and important details about it

Raghad Shubbar Jaafar

University of Basra/Marine Science Center/Biological development department

raghad.jaafar@uobasrah.edu.iq

Abstract:

The rapid and global spread of COVID 2019, made it a very serious epidemic disease, and urged scientists and specialists to make great efforts to find appropriate treatments and vaccines to save the world from such an epidemic. However, despite the efforts made, all the data obtained confirm that what has been achieved is only temporary solutions, and it takes almost a year to clinically apply. Data shows that compliance with prevention and quarantine instructions is the most effective solution among them.

Key words: Covid2019, classification, gene structure, symptoms, therapeutics, the vaccine

Introduction

Corona virus responsible for causing Coronavirus disease 2019 (Covid 2019), which is a respiratory disease spreading through a person to another. The agent that causes COVID-19 is a novel Coronavirus firstly identified during the outbreak of virus disease in Wuhan, China <https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html#geographic>.

Today seven types from this virus recognize by the doctors, which can infect humans. The strains, which can cause that cause very intense complications include MERS-CoV, that reasons for the respiratory syndrome of the Middle East (MERS), and SARS-CoV, the virus answerable for severe SARS. In 2019 SARS-CoV-2 the new dangerous strain causing the disease COVID-19 [1]. So far, no precise details have been reached on this virus, such as its origin and ability to spread between humans or its spread from the animal to human, however, what is available from previous information about both SARS and MERSA, provided information on how it is transmitted between humans or how it transforms from animal to human. The increase in the number of infected people is a result of the transmission of the virus between humans. The research is limited on how the HCoV spreads among humans. However, they believe between the researchers that viruses spread by the fluid in the respiratory system, such as saliva. The infection by this virus can come from different ways; Coughing and sneezing, shaking or touching with the person having the virus, and touching the surfaces containing the virus and then touching the nose, eye or mouth [1]. The emergence of infections with this virus and its transformation into a pandemic situation has become a "global" threat, as such an outbreak may not be avoided in the future as a result of changes in the environment and climate and to increase

human interactions with animals and as a consequence, there is a crucial necessity to develop both treatments and vaccines for such epidemics[2].

Classification of Coronavirus

Coronavirus related to the family of Coronaviridae (subfamily Coronavirinae) [3], four genera included within this family : Alphacoronavirus, Betacoronavirus, Gammacoronavirus, and Deltacoronavirus[2]. Coronavirus located within the Beta genera, that capable of infecting a wide range of mammals, the virus species like SARS-CoV, HCoV-OC43, HCoV-HKU1 can infected mice and human, and MERS-CoV, Murine coronavirus (MHV) and Bovine Coronavirus (BCoV) [4].The classification of Coronaviruses depending on different factors including: the organization of the genome, genomic sequence similarity, the viral protein antigenic properties, replication strategies, virion structural characteristics, Pathogenicity, cytopathogenic and physicochemical properties[5]

The genome structure of Coronavirus

Coronaviruses (CoVs) are a group of enveloped viruses containing crown-shape peplomers with 80-160 nM in size ,the virus is non segmented positive-sense, single-stranded RNA viruses (~30 kb) one of the largest among RNA viruses[6], with 5' cap structure and 3'poly-A tail, means the RNA sequence of the virus can translate to protein directly(need for viral replication). Recombination rates of CoVs are very high because of constantly developing transcription errors and RNA Dependent RNA Polymerase (RdRP) jumps[7]. Two-thirds of Coronavirus RNA encodes the viral polymerase (RdRp), RNA synthesis materials, and two large nonstructural polyproteins that are not involved in modifying the host response (ORF1a-ORF1b). The last third of the genome encodes into four synthetic proteins (spike (S), envelope (E), membrane (M) , (E) glycoproteins, Hemagglutinin Esterase (HE) and Nucleocapsid (N) protein(Figure 1) (Luk et al., 2019 and Tok & Tatar, 2017). The number of accessory proteins and their function is unique depending on the specific coronavirus <https://en.wikipedia.org/wiki/Coronavirus>.

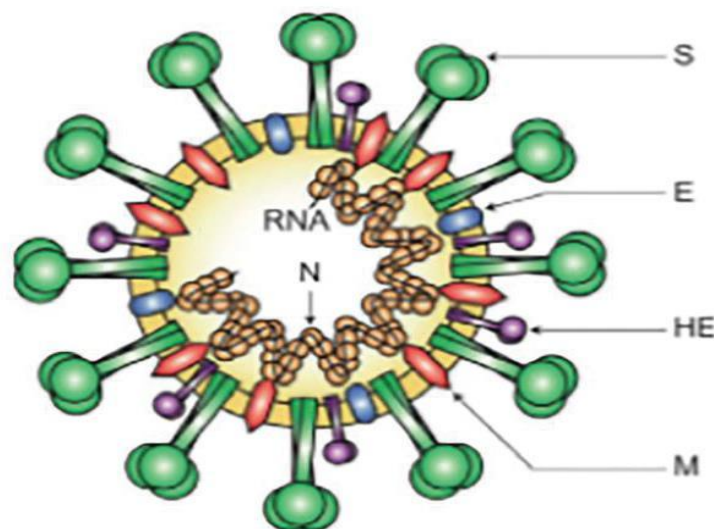


Figure 2: The structures of coronavirus explain structural proteins : Spike protein(S), Membrane protein(M), Hemagglutinin-Esterase(HE) and E: Envelope protein(E) [10]

COVID-19 Symptoms

Diagnosed cases around the world reported similar symptoms, which included the following symptoms, fever, cough, muscle aches and tiredness. Most cases suffered from pneumonia and some of the acute and killer respiratory disease [11].

Diagnosis

After the World Health Organization announced the spread of the Corona epidemic, there is concern in the international community and an urgent need to find ways to quickly diagnose and detect vaccines to combat the disease.

Among the many diagnostic methods available, RT-PCR is the most approved one for diagnosing the Corona virus [12]. The time and type of sample gathered have major role in the diagnosis of COVID-2019 using RT-PCR. The main benefit of using RT-PCR in the diagnosis is the exclusion of false positive results, that As both expansion and analysis are concurrent "within a closed system. Different molecular targets within the single stranded RNA genome of Coronaviruses can be targeting throughout the PCR assays, these target parts include synthetic proteins, as envelope glycoproteins spike (S), envelope (E), transmembrane (M), helicase (Hel), and nucleocapsid[13]. In addition to the genes that encode structural proteins, there are special secondary genes for each species that are necessary in the reproduction of virus, A polymerase (RdRp), hemagglutinin-esterase (HE), and open reading frames ORF1a and ORF1b. WHO recommends first line screening with the E gene assay followed by a confirmatory assay using the RdRp gene.

In the early stage of infection the serum specimens shows negative test for the virus ,while the respiratory specimens show positive test, this is indicated to the fact that within the first week of the initial symptoms, patients verified rise in viral loads in their superior and poorer respiratory tract[14] . At this stage, it is usually recommended to approve smears from the nasopharyngeal (NP) and/or an oropharyngeal (OP) for scanning or diagnosis, with preferring NP as it more tolerate by patient and safe to the operator in addition it can extent the right position to be tested in the nasal cavity[13]. early infection. It was also confirmed that in the first days of the disease, although the symptoms were mild, the patient carries high levels of virus (Junxiong Pang , Min XianWang , Ian Yi Han Ang et al., 2020). In the late detection with pneumonia patient the sputum and bronchoalveolar lavage should be depended.

Analytical issues

Assay selection

Using immunoassay, this is considered lateral flow assay has rapid diagnosis, thus saving time and low cost. These methods were developed to confirm the antigenic response toward SARS-CoV-2 virus or for confirming the presence antibodies (IgM and IgG] after COVID-19

infections, however, these tests have proven to be inaccurate, depending on "experiments used to detect influenza (Flu) viruses[15]. Monoclonal antibodies generated against SARS- CoV-2 fall within the list of established diagnostic methods (<https://www.medrxiv.org/content/10.1101/2020.03.07.20032524v1>).

Serological tests can be used to confirm advanced cases of infection with the Coronavirus, and to detecting health provider immunity system efficiency , as it takes a long time to formulate specific responses from immune globulins IgG and IgM.

Cure and Infectivity tested

There are tests that the recovering patient must undergo, and through which results it is possible to determine whether the recovered person must continue in the home quarantine or not. The sample in this period must depend on positive/negative RT-PCR of rectal sample

The potential of therapeutics

1. Treatment

Regardless of the socio-economic damage caused by the spread of the Covid 2019, and with the possibility of serious epidemic diseases caused by new strains of this virus, there are no strategies available to provide antivirals to treat such epidemics or to prevent their spread in the future is not available till this moment.. Till now the WHO doesn't recommend to any antiviral or antibacterial drug to treat the patient with COVID 2019 and consider the most effective treatment to this viral outbreak is the taking the right measures to control COVID-19. Numerous studies have confirmed the absence of a definitive treatment for Coronavirus, and confirmed that the treatments used are only supportive. Both of recombinant IFN and ribavirin have restricted effects versus CoVs infection[6]. Efforts have been made to develop targeted new antivirals after the occurrence of SARS and MERS epidemics, these novel antivirals targeting CoVs proteases, polymerases, MTases, and entry proteins, however, it has not been proven effective in clinical trials [16]. Currently, a new therapeutic trend is being made with the use of plasma and antibodies from convalescent patients [17]. After the outbreak of COVOID2019 during this year, scientists try to find assistant drug to the patient with sever pneumonia :Gao, Tian, & Yang, (2020) investigated that the anti-viral and anti-inflammatory activities of chloroquine may account for its potent efficacy in treating patients with COVID-19 pneumonia. [19] reported their cases patients in the Zhejiang province received treatment with corticosteroid (40-80 mg/day) and gamma globulin (15-20 g/day) for 3-5 days. Rosa & Santos, (2020) identified 24 clinical trials, involving more than 20 medicines, such as human immunoglobulin, interferons, chloroquine, hydroxychloroquine, arbidol, remdesivir, favipiravir, lopinavir, ritonavir, oseltamivir, methylprednisolone, bevacizumab, and traditional Chinese medicines (TCM). There are many anti-coronavirus agents, most of which have not undergone clinical tests. Some of these agents fall within the experiences of the third trials stageare for COVID-19, including remdesivir, oseltamivir, ASC09F (HIV protease inhibitor), lopinavir, ritonavir, darunavir, and cobicistat[3].

Vaccination

Since the diagnosis of global cases of Coronavirus infection until today, there are 15 types of vaccines that are under study as they carry the possibility of application as a universal vaccine for this virus. The scientific principle in applying these vaccines depends on many techniques (such as messenger RNA, DNA-based, nanoparticle, synthetic and modified virus-like particle), These globally recommended vaccines "need about a year to start the first stage of clinical trials. In the meantime, repurposing existing and safe vaccines that induce non-specific immune benefits may be an additional tool.[21] Whereas, the vaccine developed by the BGI was approved in China after the approval of the National Medical Products Administration, and currently it is used in Chinese clinics and observation centers[22]. Mechanistic evidence exists to suggest that vaccination with Bacillus Calmette-Guérin (BCG), can have protective effects against viral infection [21].

Prevention and control

In view of the lack of a vaccine for Covid2019, there are many recommendations that have been adopted worldwide to limit the spread of this disease. The best methods to prevent the spread of infection with this virus are as follows :It is recommendeds to use a face cap and avoids touching the face area with hands, use the elbow arm to cover coughing or sneezing, or it is imperative to use tissue paper that must be disposed of properly, caring for hand hygiene by repeatedly washing it with soap and water for 20 seconds or replacing washing with alcohol sterilization with the use of 60% diluted alcohol, It is also advised to avoid contact with infected people and to keep a distance of not less than 1-2 meters between them.

Conflict of interest

The author confirms that there is no conflict of interest

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