INTRODUCTION

The uncertain SARS-CoV-2 a novel respiratory pathogen is on peak with its virulence nature, epidemiological, clinical and virological characteristics. Many strong pandemics in earlier period have already shown evidence of its contagiousness, including Black Death (Bubonic plague) during 1347-1351 with 200 million death 1918 influenza pandemic during 1918-1919 with 40-50 million death and currently the pandemic Covid 19 from 2019-present with a huge death rate (Nicholas LePan, 2020). Among humans, coronavirus infections most often spread during winter months and early spring. During December 2019, a severe case of pneumonia due to unknown cause was accounted in Wuhan, Hubei province, China related to a seafood market in Wuhan and disease spread speedily all through China. The contagion found was a typical kind of virus originally named as 2019 novel coronavirus (2019-nCoV-2) (Worlddorder, 2020). WHO afterward declared its name as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and in January 2020 stated as a Public Health Emergency of International Concern because of its stronger transmission capacity. WHO characterized the New corona virus disease COVID-19 as a pandemic on 11 March 2020 (WHO, 2020). WHO provided a range of early seroepidemiological investigation protocols just after the emergence of a new virus outbreak. Covid virus might be circulating several months before from the detection of constant transmission in December 2019. The incidence rate of infection got double in every 7.4 days in early stages and basic reproductive number estimated as 2.2 (Li et al., 2020).

SARS-CoV-2: Etymology

“Corona” term in Latin means a “crown” and SARS-CoV-2 posses crown-like projections on its surface thus it was named as “Corona”. COVID-19 which is an abbreviation of Corona Virus Disease 2019, has been identified as a new kind of strain belongs to Betacoronavirus group 2B and 70% genetically similar to SARS-CoV(Hui et al., 2020). Covid 19 virus possesses positive sensed single-stranded RNA (ssRNA) genome of approximately 27 to 34 kilobases with a capsid of helical symmetry. The genome belongs to family Coronaviridae (Chan et al., 2020). coronavirus four genera have been recognized (alpha, beta, gamma, delta) and human coronaviruses (HCoVs) is kept in the alpha type coronavirus (HCoV-229E and NL63) and Beta coronavirus (MERS-CoV, SARS-CoV, HCoV-OC43 and HCoV-HKU1) (Fehr et al., 2009). Human coronavirus include HKU1, Human coronavirus OC43 (HCoV-OC43), Human coronavirus NL63 (HCoV-NL63), New Haven coronavirus and Human coronavirus 229E (HCoV-229E) (Drosten et al., 2020), Middle East respiratory syndrome-related corona virus (MERS-CoV) (novel coronavirus 2012), Severe acute respiratory syndrome...
corona virus (SARS-CoV or SARS-classic) and existing Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) also known as 2019-nCoV or "novel corona virus 2019 (Sexton et al., 2005).

**SARS-CoV-2: Transmission**

COVID-19 is a kind of pneumonia, which In Severe conditions produce enormous alveolar damage and a constant respiratory damage and consequently to death (Huang et al., 2020). The incubation period of COVID-19 is suggested between 3 and 7 days. (Chan et al., 2020). Virus survival potential varies depend on the surface attached for instance in aerosols for three hours, up to three days on plastic and stainless steel (Doremalen et al., 2020). Corona virus survive on metal, glass, or plastic surfaces for up to 9 days. It can be efficiently inactivated When staying on dead surfaces by the help of 0.1% sodium hypochlorite/ 62–71% ethanol/ 0.5% hydrogen peroxide within1 minutes(Kampf et al., 2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been recognized as its asymptomatic and symptomatic both kind of disease and with zoonotic transmission means a disease that can be transmitted from animals to people. SARS-CoV-2 infection is thought to spread via respiratory droplets, contact with bodily fluids and with contaminated surfaces (Chan et al., 2020)( Fuk-Woo et al.,2020). Surface contamination is found evident in SARS-CoV-2 symptomatic patient. SARS-CoV-2 transmission occurs via respiratory droplets, contact with bodily fluids and with contaminated surfaces (Chan et al., 2020). Individuals with asymptomatic features also capable to transmit infection (Rothe et al., 2020). The origin of COVID-19 virus is still ambiguous and is supposed to be originated by a typical virus spreading disease in mammals and also in few other animals.

In a study it was explained that continuous raise in Chinese human population, people begin to eat different types of animals like bats, frogs, pangolin snakes and birds etc (Zhou et al., 2019) that resulted into a zoonotic transmission. There are multiple reports of asymptomatic patients testing positive for SARS-CoV-2(Chan et al.,2020) and these asymptomatic person are potential transmitter of the virus(Bai et al.,2020). Bats are naturally supposed to contain a multiple of coronaviruses, including RaTG13, that is the closest known relative of SARS-CoV-2. When a comparative study was made of human and horseshoe bat intestinal organoid model of SARS-CoV-2 infection found that both human and bat enteroids show angiotensin-converting enzyme II (ACE2) and the protease TMPRSS2. These researchers were also able to get infectious contagion from the stool of a COVID-19, 68 year old patient with diarrhea (Natures Medicine, 2020)

**SARS-CoV-2: Pathogenicity and Investigation protocols**

SARS-CoV-2 infection is a new transmissible disease outbreak affecting all populations all through the world (Burki, 2019). SARS-CoV-2 typically found distinguished from other known viruses such as influenza viruses, parainfluenza virus, adenovirus, respiratory syncytial virus, rhinovirus, SARS-CoV and also from pneumonia such as mycoplasma pneumonia, chlamydia pneumonia, and bacterial pneumonia (Jin et al., 2020). The SARS-CoV-2 infected persons show symptoms such as fever, fatigue, dry cough, dyspnea, and other upper respiratory symptoms (Holshue et al., 2020). In severe conditions infection may give rise to shortness of breath, weakened breath sounds and increased or decreased tactile speech tremor. CT imaging examination vary with the patient’s age, disease stage, underlying diseases, immunity status at the time of scanning (Chung et al.,2020). Chest X-ray examination images in pneumonia patients show multiple small patchy shadows and interstitial changes. In other study, 41 patients were found with confirmed SARS-CoV-2 infection after reported chest radiography to have bilateral lung involvement on (Chaolin et al., 2020). RT-PCR diagnose by real time in suspected patients of SARS-CoV-2 infection (Corman et al., 2020). Diagnostic procedures of CoVID-19 mainly include virus isolation and its nucleic acid study. A variety of specimens (such as swabs, nasal swabs, nasopharynx or trachea extracts, sputum or lung tissue, blood and feces)should be retained for testing in a timely manner, which gives a higher rate of positive detection of lower respiratory tract specimens (Yu et al., 2020). Albert and co-workers of Yale School of Public Health compared the sensitivity of PCR with reverse transcription (RT–PCR) detection of SARS-CoV-2 in nasopharyngeal swab and saliva samples taken from Covid-19 patients and healthcare workers. In a preprint published in medRxiv, Saliva was found more sensitive and more consistent throughout the experiment of SARS-CoV-2 infection. In a study in The Lancet severe cases of Covid 19 out of 10 of the 5 patients developed Kawasaki disease shock syndrome (KDSS), whereas over the previous 5 years none of the 19 Kawasaki disease in the hospital had shown any development of KDSS.

**SARS-CoV-2: Infection**

SARS-CoV-2 possess two distinct features in genome sequence are receptor-binding domain (RBD) in spike protein with a high affinity to human or human-like angiotensin converting enzyme-2 (ACE2) receptors and other polybasic cleavage at the junction of subunits S1 and S2 of spike, which may determine the infectivity and pathogenesis of the virus (Lu et al., 2020). Genetic analysis done on 103 genomes has indicated that SARS-CoV-2 evolved into two major types, S and L. The L-type is more widespread, seen in about 70% of the cases in Wuhan (Tang et al.,2020). Mutations and deletions have also been recognized in genome of virus samples isolated from patients across countries, indicating genetic diversity and evolution of virus (Phan et al., 2020). SARS-CoV-2 mainly invades alveolar epithelial cells, resulting in respiratory symptoms.SARS-CoV-2 infection in host cells occurs through ACE2 receptors, leads to pneumonia and also acute myocardial injury by affecting the cardiovascular system. But, 2019-nCoV binds to ACE2 with much higher affinity about 10-20 times more than SARS (McLellan and Wrapp, 2020). Thus cardiovascular system should a matter of concern (Zheng et al.,2020). Angiotensin-converting enzyme 2 (ACE2) is a kind of aminopeptidase remain membrane bounded and support functioning such as cardiovascular and immune systems. At the time of infection SARS-CoV-2 spike protein binds to ACE2 receptors (Turner et al.,2004). The spike composed of glycoproteins (S proteins) made up of two subunits (S1 and S2) make Homotrimers further support to link with host receptors. The virus uses its spike (S) protein to infect the target cells and binds to the angiotensin-converting enzyme 2 (ACE2) receptor and then synthesize viral polypeptides. RNA-dependent RNA polymerase and exoribonuclease are main replication and
transcription machinery in Corona virus. RNA-dependent RNA polymerase (RdRp) supports in the replication and transcription of RNA (Chan et al., 2020). Virus subsequently synthesizes RNA by its RNA-dependent RNA polymerase (Fang et al., 2020). Genome of SARS-CoV-2 found similar to typical CoVs with at least ten open reading frames (ORFs). First ORFs (ORF1a/b), form about two-thirds of viral RNA and translate two large polyproteins (polypeptides pp1a and pp1ab). When Sars-Cov-2 compared with Sars-CoV gene sequence concluded that structure of transmembrane helical segments present in the ORF1ab which encode for nsp2 and nsp3 and the serine present at position 723 instead of glycine residue, though the position 1010 replaced by proline at the place of isoleucine (Angeletti et al., 2020).

The patients with a history of SARS-CoV infection showed deregulated lipid metabolism after metabolomics analysis. In these persons, serum concentrations of lysophosphatidylcholine, lysophosphatidyl ethanolamine, free fatty acids, and phosphatidylglycerol were found elevated (Wu et al., 2017). ARDS is the primary reason of fatality in COVID-19 (Bonow et al., 2020). Severe infected persons revealed Cytokine Storm Syndrome (CSS), consequently arising Acute Respiratory Distress Syndrome (ARDS), Sepsis and multi-organ failures. A cytokine storm seen in Secondary haemophagocytic lymphohistiocytosis (sHLH) is seen in severe COVID-19 disease, which shows increased interleukin (IL)-2, IL-7, interferon-γ inducible protein 10, granulocyte-colony stimulating factor, monocyte chemo attractant protein 1, macrophage inflammatory protein 1-α, and tumour necrosis factor-α (Huang et al., 2020). SARS-CoV-2 infection nasopharyngeal viral loads was found at the peak in its first week among COVID-19 patients (Zou et al., 2020, Wang et al., 2020). The SARS-CoV-2 spike is just similar in sequence and structure to SARS-CoV spike protein12 and protein fold manner of MERS-CoV spike protein (Wrapp et al., 2020).

During influenza infection a Cytokine storm production occurs in which Viruses infect lungs epithelial cells and alveolar macrophages and give rise to virions thus release cytokines containing interferons. Released cytokines attract enormous inflammatory cells at the site of inflammation, thus amplify cytokine storm (Williams et al., 2020).
In another study Guinea pigs and mice were immunized with INO-4800 antigen-specific T cell responses and functional antibodies were found which neutralize the covid 19 infection and block the Spike protein binding to the ACE2 receptor(Smith et al.,2020). In a study data suggested that a monoclonal antibody CB6, which was isolated from a convalescent COVID-19 patient showed neutralizing activity which can be helpful as a potential therapeutic agent for the disease(Shi et al.,2020). lopinavir and ritonavir which is the combination of HIV protease inhibitors was an early drug in for COVID-19 treatments. Several medicines are tested including two of the combination of drugs (chloroquine and hydroxychloroquine) and one of the investigational agents Remdesivir is currently used in the United States(Wang et al.,2020). Chloroquine which is well known for the treatment of malaria is also used as a drug for Covid 19 due to its activity in certain inflammatory conditions. Hydroxychloroquine is used for treatment of rheumatoid arthritis and systemic lupus erythematosus. The Drug Hydroxycloroquine show its in-vitro activity in case of other Corona viruses, SARS-CoV and SARS-CoV-2 and (Colson et al.,2020). Clinical trials reported that hydroxycloroquine alone or given in combination of azithromycin reduces infection of SARS-CoV-2 RNA in upper respiratory tract (Gautret et al.,2020) Remdesivir is shows its antiviral activity and inhibits RNA replication by premature termination of RNA transcription thus demonstrates in-vitro activity against SARS-CoV-2 and in-vitro as well as in-vivo activity against betacoronaviruses. Studies suggested remdesivir (GS5734) an antiviral drug which was positively tested in a rhesus macaque for MERS-CoV infection (Gordon et al.,2020). The clinical trial to establish a proper treatments and vaccines are on continuation.US National Institute of Allergy and Infectious Diseases (NIAID) declared that they sponsored a highly powered trial which showed a straightforward effect and reduce median recovery time from 15 to 11 days. In recent researches Sanofi and Regeneron have done trial of sarilumab, their monoclonal antibody against the interleukin-6 receptor, to exclude COVID-19 patients. In another trial Lackluster resulted that lowered dose 200 mg, can exclusively on patients found ‘critical’. Yale School of Medicine explained a case of COVID-19 in a second trimester pregnancy with preeclampsia and infection of placental syncytiotrophoblasts due to inflammation. (Hosier et al.2020).

DISCUSSION

WHO advised to public to live in properly hygienic environment, to adopt hand and respiratory hygiene and safe food practices and avoiding public gatherings by Immuno compromised persons with acute respiratory infection people and consumption of raw or undercooked animal products(WHO,2020). WHO and other international public health bodies has largely focused on stopping transmission, finding infection control measures, and screening of travelers (Zumla et al., 2020). Existing treatments for COVID-19 is only its management and strict isolation in addition to followed by other ongoing experimental clinical trials treatments (Worldometer, 2020). COVID-19 causes respiratory failure due to acute respiratory distress syndrome (ARDS) and result into mortality thus ARDS management is found crucial (Ruan et al.,2020). SARSCoV-2 spread has been found associated with regional and international travel converted it in to the pandemic (Candido et al., 2020). Due to this reason India and other countries commenced a complete nation-wide lockdown and discontinued travelling as prevention from transmission of novel Corona virus to save millions of lives (Subramanya, 2020). Some studies suggest physical distancing can be continued for 3 months for the mitigation the climax and may require for 12 to 18 months on irregular basis (Flaxman et al., 2020). In a study on characteristics and psychological status of persons in a group showed depression among 27.1% of respondents and 7.7% had psychological abnormalities, about 10.1% suffered from phobia and around 93.3% of respondents avoided to go to public. The regularly used preventive measures are avoiding trips outside and contact (98.0%), wearing mask (83.7%) and hand hygiene (82.4%). (Liu et al).

The UK’s Department of Health and Social Care announced a plan to diagnose COVID-19 at home. Imperial College Healthcare NHS Trust, and market research firm Ipsos MORI termed the plan as Real-time Assessment of Community Transmission (REACT) with two stages REACT-1 and REACT-2. In REACT-1 the person will collect their own nose and throat swab, and that will be collected by courier for PCR testing for SARS-CoV-2. In second, REACT-2 a serological tests will be done to identify antibodies to SARS-CoV-2.

Reference


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