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Covid-19: An Epic Perennial Pandemic

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BACKGROUND

Today the term "pandemic" is both a metaphor for a global process and a specific instance of that process. The process in question is a distorted form of development, whose expression in neoliberalism has produced in "pandemic" fashion colossal but highly concentrated wealth, enormous inequality and vast environmental destruction, with profound implications for the construction of risk to natural and anthropogenic hazards globally[1]. The specific instance is the COVID-19 pandemic, a global disaster the scale of which transcends ecological regions, national borders, economies, and societies, overwhelming their specific capacities to address disruption of societal functions. Parallel to other pandemics, the outbreak of corona virus is expected to bring catastrophe to the human civilization as an uncharted arena.

COVID-19 is a novel form of corona virus which has spread from its initial identification in Wuhan, China, and has been declared a pandemic by the World Health Organization (WHO)[2]. Corona viruses are a large family of viruses that cause illnesses ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERSCoV) and Severe Acute Respiratory Syndrome (SARS-CoV). Corona viruses are zoonotic, meaning they are transmitted between animals and people. Several known corona viruses are circulating in animals that have not yet infected humans[3] butit appears that COVID-19 has crossed species from bats tosnakes [4], and pangolins then to humans, initially via the live animal 'wet markets' of Wuhan[5].In December 2019, novel Coronavirus-2019 has emerged in the Huanan Seafood Market, where livestock animals were also traded, in Wuhan State of Hubei Province in China and has been the sheer global attention due to clusters of pneumonia cases with unknown cause[6].The virus was named as 2019-nCoV by WHO on January 12 for an interim period and the disease as COVID-19 on 11 February2020.

The viral agent (SARS-Cov-2) of COVID-19belongs to the genus Corona virus in Corona viridae family and are pleomorphic enveloped with a positive sense single-stranded RNA genome (26–32 kilobases), 80–160 nm in size characterized by crown-shape peplomers emanating from the surface.[7] Adaptation to cells of different host species readily occurs since coronaviruses possess error-prone RNA-dependent RNA polymerases, fostering mutation and frequent recombination events. Along with its high mutation rate, corona viruses are present in diverse species of animals, e.g., bats, camels etc, infecting humans with the manifestation of a wide range of clinical features from mild illness to fatal respiratory issues causing imminent threat ofhospitalization.[8] Additionally, researchers emphasized that spike protein of the virus is 10 to 20 times more efficient in binding with hACE2 compared to the SARS-like virus from 2002; hence the COVID-19 appeared more contagious than the earlier SARS- like viruses.[9]

The human transmission of the disease primarily occurs when an infected person coughs, sneezes and then through the respiratory droplets produced just as the spread of influenza and other respiratory viruses. These droplets can settle in the mouth or nasal mucosa and lungs of other people during inhalation while considered to be highly contagious when people are mostly symptomatic[10].

The genome of SARS-CoV-2 is similar to that of typical CoVs and contains at least ten open reading frames (ORFs).The first ORFs (ORF1a/b), about two-thirds of viral RNA, are translated into two large polyproteins (pp1a and pp1ab) and sixteen non-structural proteins (nsp1-nsp16), which generate the viral replicas transcriptase complex 1. The remaining one-third of ORFs of the genome encodes four main structural proteins: spike (S), envelope (E),

membrane (M) proteins and nucleocapsid (N). The infection is initiated with the interaction between spike proteins and reciprocal receptor of human cells. It has been implied that the spike proteins of the corona virus fundamentally get attached to human angiotensin converting enzyme 2 (hACE2) proteins of the host cells [11]. Being within the cells, the newly formed envelope glycoproteins are inserted into the membrane of the endoplasmic reticulum or Golgi, and the nucleocapsidis formed by the combination of genomic RNA and nucleocapsid protein. Then, viral particles germinate into the endoplasmic reticulum- Golgi intermediate compartment (ERGIC). Finally, the vesicles containing the virus particles fuse with the plasma membrane to release the progeny viruses by exocytosis which can infect cells of lower respiratory tract, kidney, liver and the intestines where they instigate the symptoms and signs [12].The hACE2 may play a role in the regulation of cardiovascular function and renal function while people with hypertension and impaired renal function are prone to be more vulnerable to COVID-19. Additionally, researchers emphasized that spike protein of the virus is 10 to 20 times more efficient in binding with hACE2 compared to the SARS-like virus from 2002; hence the COVID-19 appeared more contagious than the earlier SAR Slike viruses [11].Moreover, the rapid genomic changes emanated from recombination, gene exchange, gene insertion, or deletion are frequent among CoVs which will be correlated with future emergence of the outbreaks with new strains or reemergence of the previous strains as in past epidemics.

The virus damages the function of CD4+ T cells accelerating activation and possibly subsequent exhaustion of CD8+ T cells; together, this may eventually wane host antiviral immunity.[13] Similar to other SARS-CoV, the infection shows elevated levels of IL-6, IFN-α, and CCL5, CXCL8, CXCL-10 in serum. The cytokine storm will trigger a violent attack by the immune system to the body, cause ARDS and multiple organ failure, and eventually lead to death in severe cases of SARS-CoV-2 infection.[14]The diagnosis of COVID-19 is based on a history of detailed contact, travel, and precise laboratory testing. The laboratory modalities used to diagnose are molecular methods, immunological tests and viral culture. The suspected cases should be screened for the virus with nucleic acid amplification tests (NAAT), such as RT-PCR. The rRT-PCR is performed using viral RNA from respiratory samples; for instance or opharyngeal swabs, sputum, nasopharyngeal and tracheal aspirates and bronchoalveolar lavage. In particular, lower respiratory tract samples can offer significantly higher viral load and genome fraction than upper respiratory tract samples.[15]Immunological surveys can aid investigation of an ongoing outbreak and retrospective assessment of the extent of that outbreak. In cases where NAAT assays are negative and there is a strong epidemiological link to Covid-19 infection, paired serum samples (in the acute and convalescent phase) could support diagnosis once reliable tests are available and serum samples can be stored accordingly[16]. Moreover, the role of rapid assessment for antigen detection forCovid-19 needs to be evaluated. On chest radiography or thorax CT imaging of the examined patients, unilateral or bilateral lung involvement compatible with viral pneumonia was evident and bilateral multiple lobular and sub- segmental consolidation areas were observed in patients admitted in the intensive care unit.[15] The patients with underlying comorbidity exhibited a more severe clinical course, as speculated by the experience gained from the previous epidemics. The gravity of the situation in terms of spread and severity of the virus is substantially considerate with around 3–5% current mortality rate.

There are as yet no antiviral drugs approved for the disease, and hence, nontherapeutic interventions to control the spread of the virus are the most effective measures to control the disease. There is however a thin line of hope as there are drugs like favipiravir that blocks RNA-dependent RNA polymerase and remdesivir, a ‘nucleotide analogue’ drug that has shown some promise in the treatment. Moreover, the generation of recombinant human monoclonal antibody (mAb) [tocilizumab (anti IL-6 receptor), bevacizumab (anti VEGF-A)] is a fairly straightforward path to neutralize SARS- CoV. The mAb is assumed to bind potently with the receptor-binding domain (RBD) of SARS-CoV-2 and has the potential to be developed as candidate therapeutics of SARS-CoV-2infections.[17]

The CDC, Atlanta reminds basic measures such as hand washing, using disinfectant solutions, avoiding proximity with patients and social distancing of people in order to prevent the spread of viruses. Precautionary actions including the provision of medicines supply chains, personal protective equipment (PPE),

and availability of hospital supplies should be assured in a short time for the protection of the people [18]. The reason for escalating awareness is that there are reported cases of infected hospital personnel. Therefore 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 history of Covid-19 contact or travel history [19].

As we are dealing with an obscure malady, the focus should be given on containing it by strengthening widespread surveillance, conducting thorough investigations to identify contacts and applying appropriate measures to prevent further spread. Several factors underlie the emergence of such diseases including increased population, poverty, malnutrition and global connectivity, economic factors leading to population migration, social practices, unplanned urbanization, deforestation and change in agricultural practices [10].On a different consideration, this subcontinent has extremely geo-climatic diversity; as a result countries face a sustained threat of emerging and reemerging viral infections of public health importance. At the same time, there is also a pressing need to gain detailed insights into disease biomics, including genomic architect and cell biology of natural (animal) and accidental (human) hosts and environmental factors influencing the viral adaptation for favoring replication.

Lastly, it is also important to enact the emergency preparedness for these diseases and response by focusing on ‘one health’ approach and avoiding pointless panic to develop cognizance during the critical juncture in the outbreak. We hope that global awareness and cooperation among all walks of people along with the enormous effort of the scientists will remain vibrant in coming days. This would trigger and ensure a less damage and in doing so we would want to see Covid-19 free world, a real way to combine the drifts of survival, which so far the human civilization has been developed from previous experiences, by compulsion.

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