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A REVIEW ON COVID-19 PANDEMIC OUTBREAK

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ABSTRACT

The emergence of SARS-COV2 from Wuhan at the end of December 2019 has spread to more than 200 countries is the leading cause of deaths. Belonging to be β-COV with single- strand RNA attacks the Human Respiratory System. The COVID-19 symptoms appear after incubation. The appearance of symptoms varies depending on the age and status of the immune system. Globally, current trials are on vaccines and focused on plasma therapy with the survivor's plasma and Herd immunity.

KEYWORDS: SARS-COV 2, Alveolar epithelium, Herd immunity, Plasma therapy, Disinfectants.

INTRODUCTION

The global emergence of severe accurate emergence syndrome Corona virus 2 (SARS-COV2) disease in December 2019, a cluster of cases of unexplained viral pneumonia was identified in Wuhan city, a metropolitan in Hubei province people republic of China (PRC).[1] Later named as COVID-19 has caused a large outbreak globally and is leading cause of deaths worldwide.[2] The first case was reported in Wuhan seafood market where numerous types of live wild animals are sold including poultry, bats, grand hogs and snakes. According to World Health Organization (WHO) viral diseases to grow continue and emerge and respect a serious issue to public health and pose a challenge for human survival on January 30, 2020. The WHO declared the outbreak of novel corona virus as public health emergency. Several virus diseases, severe acute respiratory syndrome corona virus (SARS-COV) in 2002-2003, H1N1 influenza in 2009, middle east respiratory syndrome corona virus (MERS-COV) was

identified first in Saudi Arabia in 2012 and Ebola in (2014), Zika (2016) and COVID19 (2019).[2] The corona virus poses a great challenge for health workers government and public leading for economic crisis together work will prevent the further spread.

Study design

A scoping review was conducted by following steps:

- Identifying a clear review objective and search strategies.
- Identifying review related articles.
- Selection of review articles.
- Extraction of review information and adapting it.

Literature search strategies

Literature for this review was identified by searching the following online databases:
Google Scholar, Pubmed Central, Science Direct, and The Lancet.

Data extraction

After articles were selected, data were extracted and recorded. The extracted data includes Authors name, Title of Article, Name of the Journal, Year of Publication, Epidemiology, Diagnosis, and Treatment**.**

Epidemology

The first case of unidentified viral pneumonia was reported in Wuhan city, China.[3] The origin of the disease has not been determined, as most of the confirmed cases were linked to Wuhan seafood market.[4] The virus started to spread through direct contact with infected secretions or from aerosol droplets. When these secretions reach mouth, nose, eyes of a normal individual get infected. United States of America (U.S.A) is the most affected in the record of highest number of infected cases and deaths. Later on, Britain, Italy, France, Spainare most affected due to pandemic and spread to more than 216 countries with declaration of Health Emergency.

Viral Structure and Its binding

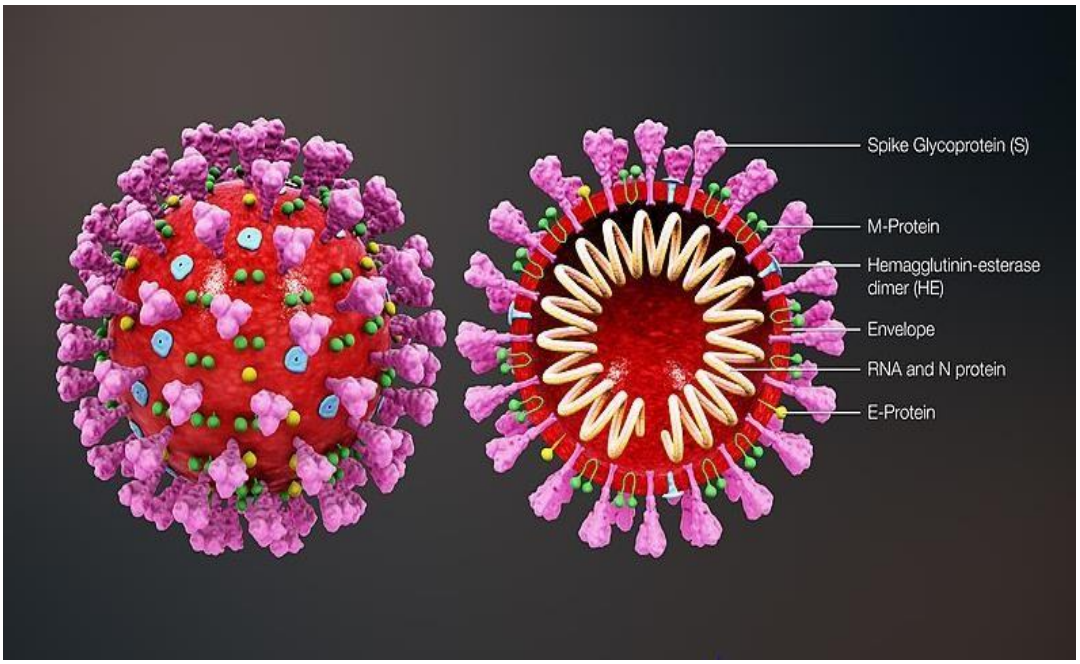

Fig 1: Viral structure.

The Corona virus (COV) is a single stranded RNA virus with a diameter OD 80-120nm. Corona virus belongs to the family *Coronaviridae,* sub family of *Coronavirinae,* in the order *Nidovirales.* It is genetically divided into four genera likely α-Corona virus (α-COV), β-Corona virus (β-COV), δ-Corona virus (δ-COV), γ-Corona virus (γ-COV).[5,6] Six Corona viruses are identified previously across the globe and the SARS-COV2 is the seventh member of the Corona family belongs to β-COV.[7] The genome sequence homology of SARS-COV2 is 79% closer to SARS. The 2019 n-COV is closer to the SARS like Bat COVS (MG 772933).[8] The Angiotensin-converting enzyme-2 (AEC-2) present in the lower respiratory tract is majorly affected in the body.[9] SARS-COV2 infects the human lung alveolar epithelial cells through receptor mediated endocytosis and causes lung infiltration.[10] The genetic sequence of SARS-COV2 is 79% similar to that of SARS like Bat COVS (MG 772933). So, SARS-COV2 is capable of using the same cell entry receptor (ACE-2) to infect humans like SARS-COV.[11] SARS-COV2 spikes bind to human ACE-2 receptors with 10-20-fold higher affinity than the SARS-COV spike. This helps the virus to spread from human to human.[12] The SARS-COV2 virus after entering into the alveolar epithelial cells, replicates at rapid rate and triggers a strong immune response and causes respiratory distress and respiratory failure. The electron microscope study, across the globe has given a detailed structural information about COVID-19. The virus is covered with pointed structures that surround them like crown like Spikes (S), Glycoproteins on their Envelop (E), Membrane

protein (M), and the Nucleocapsid (N) protein, which are essential for SARS- COV2 assembly and causes necessary infection.[13,14]

Clinical symptoms

The COVID-19 symptoms appear after incubation. The appearance of the symptoms vary depends on the age and status of the immune system. The conditions range from symptomatic to asymptomatic. The symptoms are like

- Fever (87.9%)
- Dry cough (67.7%)
- Fatigue (38.1%)
- Sputum production (33.4%)
- Myalgia (14.8%)
- Headache (13.6%)
- Diarrhoea (3.7%)
- Nausea or vomiting (5.0%)
- Haemoptysis (0.9%)

In some cases, it shows infiltration in the upper lobe of the lung showing symptoms of Dyspnoea (18.6%) and Hypoxemia.[15,16,17]

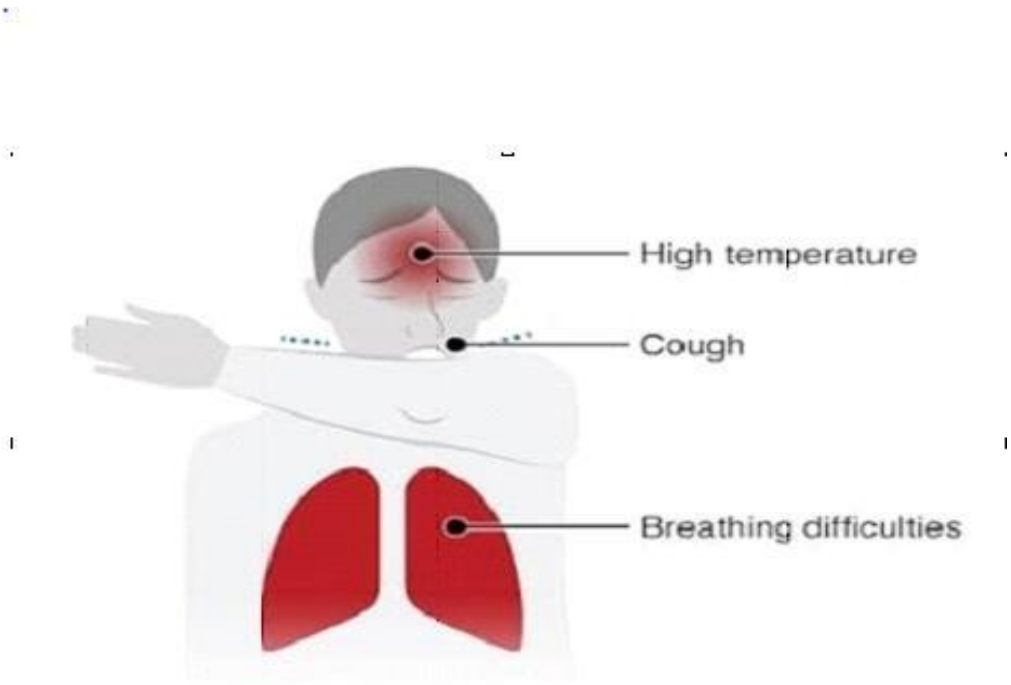

Fig. 2: Corona virus key symptoms.

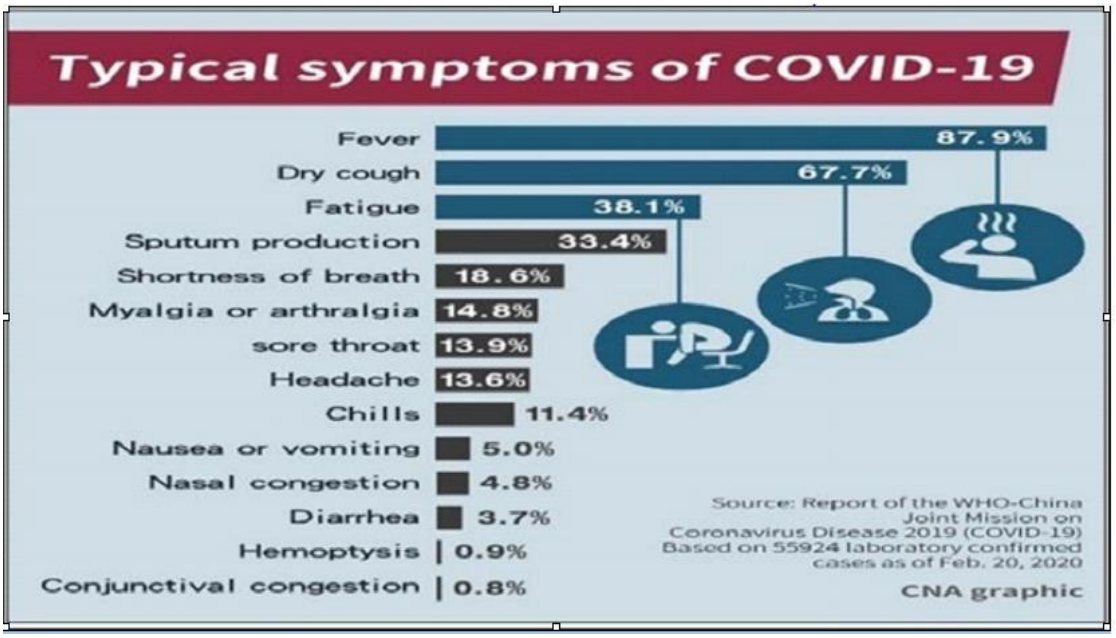

Fig. 3: Statistical data diagnostic techniques.

The rapid and accurate detection of SARS-COV2 is necessary to control the spread of COVID-19 in the community. CT imaging of chest has shown the presence of White patches, Ground glass opacities, pleural effusion with thoracic lymphadenopathy and fibrosis of lungs.[18] The viral nucleic acid detection method is the major and confirmative method which includes the highest risk for health care workers while collecting the sample from Nasopharyngeal, Oropharyngeal swabs, stool, sputum or blood samples will be examined byRT-q PCR technique but it is long and time taking confirmative process. Rapid antibody test is one of the diagnostic tools available in COVID-19 testing but the accuracy of the test has been questioned globally. Some other diagnostic techniques are available which lowers the risk to health care providers, the Rutgers ClinicalGenomics Laboratory developed anRT-PCR assay (Taq path COVID-19 combo kit) that uses self-collected saliva samples, which are quicker and less painful than the other sample collection methods.[19] Some advanced researches have shown a dual functional plasmonic biosensor combining the plasmonic photothermal (PPT) effects and localized surface plasmon resonance (LSPR). Sensing transduction provides an alternative diagnostic tool for detecting COVID- 19.[20]

Treatment

Globally due to the absence of vaccine and specific Anti-viral drugs to COVID-19, this pandemic is causing large number of deaths worldwide. The initial treatment has begun with some Anti-viral drugs in combination with some broad-spectrum antibiotics and supportive

care for patients and later trials has begun in search of vaccine for COVID-19.

Chloroquine and Hydroxychloroquine

Chloroquine and Hydroxychloroquine (HCQ) has been used widely for the treatment of Malaria worldwide. These drugs have shown tremendous impact on COVID-19 infected patients. HCQ has shown a decrease in the viral load in infected patients. HCQ has become more potent when it is added with Azithromycin. Some adverse events like Arrhythmias have been noted in cardiac patients with COVID-19 infection with use of HCQ.[21]

Anti-viral

Many Anti-viral drugs are used globally to treat SARS-COV2 along with supportive care. Remdesivir presents with antiviral activity by interfering with RNA-dependent RNA polymerase, there by inhibiting virus ability to replicate in the body. Remdesivir has originally developed to treat Ebola virus, later stages it has demonstrated with the efficacy of inhibiting SARS-COV and MERS-COV *in-vitro*.[22] Lopinavir/Ritonavir (LPV-r) co-formulated drug used as first line therapy in HIV. LPV-r has shown in-vitro inhibitory activity against SARS-COV during its outbreak in 2003. The other combination drugs ofLPV-r and Ribavirinhas shown tremendous effect in treating patients with SARS.[23] In some countries, treatment is with Human Monoclonal Antibody, Mesenchymal Stem cells, Immuno-enhancers, Intravenous Gamma globulins, NK cell therapy, Corticosteroidsbut there is no confirmative therapy for COVID-19.

Convalescent plasma

Globally, researchers are in hunt of vaccine for COVID-19. Apart from vaccine, research is keenly focusing on plasma therapy which is effective and successfully employed in the treatment of SARS-COV1 (2003) epidemic, H1N1 Influenza virus (2009) pandemic and MERS-COV (2012) epidemic. The plasma therapy is collecting the plasma from the donors who survived from the attack of infectious disease.[24] The plasma trials are giving successful results and are showing a decrease in the symptoms of COVID-19.

Opinion on how to manage cases of COVID-19

PREVENTION and CONTROL STRATEGIES are more important. Prevention at National level, Control at population level. The discovery of vaccine for COVID-19 may take a few more months. So, prevention is better way to control COVID-19.

- Identification, isolation, treatment of COVID-19 infected patients.

- Identification of primary, secondary contacts and testing.
- Identification of super spreaders.
- Importance of social distancing.
- Mask acts as a big wall for prevention of COVID-19.
- By focusing on personal hygiene and spraying surroundings with dis infectants.
- By boosting immune system (Vit-C), drinking warm water etc.

Till the approval of vaccine, prevention and control of COVID-19 at community level is biggest task.

Herd immunity

Herd immunity is an old age concept. It is an indirect immune, when most of a population is immune to an infectious disease this provides herd immunity to those who are not immune to the disease. The pandemic SARS-COV 2 has reportedly caused 115,094,614 Infected cases with 2,560,995 Deaths by March 5th 2021. Numerous clinical trials are to evaluate Novel vaccine and drug repurposing strategies for prevention and treatment of SARS-COV 2 Infection. However, it is unknown that these trials will produce an effective vaccine, it is unclear that how long these studies will take to establish efficacy and safety. In an optimistic estimate for any vaccine trial it takes 12-18 months for its outcome. By Threshold theorem that if immunity [vaccination] is delivered at random and members of population mixed at random, If R0 individual is capable in transmit the infection to the individuals who gets in contacted then Rate of infection would get Decline if proportion of immune exceeded (R0-1)/R0.[25,26]

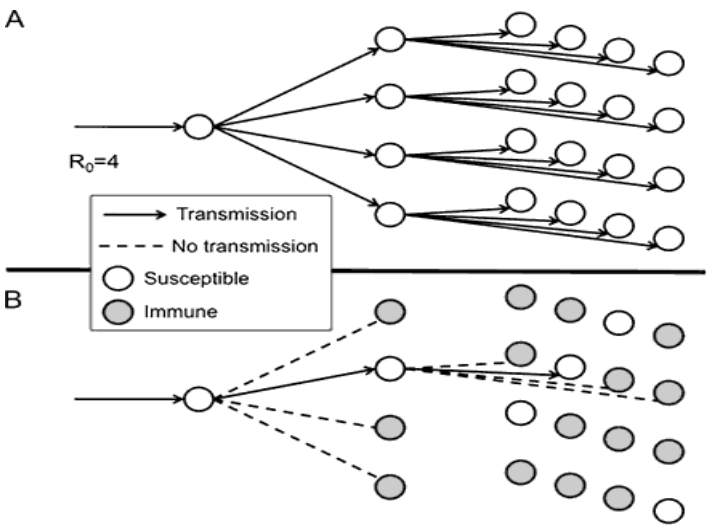

Fig. 4: Illustrating transmission of an infection with a basic reproduction number R0=4.

A. Transmission over 3 generations after introduction into a totally susceptible population (1 case would lead to 4 cases and then to 16 cases).

B. Expected transmission if (R_0-1/R_0=1-1/R_0=3/4) of the population is immune. Under this circumstance, all but 1 of the contacts for each case immune, and so each case lead to only 1 successful transmission of the infection. This implies constant incidence over time. If a greater proportion are immune, then incidence will decline on this basis (R_0-1)/R_0 is known as the herd immunity threshold**.**

Example: If 80% of population is immune to a virus, Four out of every Five people who encounter someone with the disease would not get sick (and would not spread the disease any further). In this way, the spread of infectious Diseases is kept under control. Depending how contagious an infection is, usually 70% to 90% of a population needs immunity to achieve Herd immunity.

CONCLUSION

The pandemic covid -19 has spread globally to more than 216 countries, territories, areas by causing more than 100 thousands of deaths. This pandemic led us to complete shutdown in terms of service, business, economically and restrict ourselves to safe guard from covid-19. But to what extend this shutdown is possible? not for longer time it leads to economic, employment crisis and more than that global hunger deaths. The W.H.O estimate Basic reproduction rate (R_0) is 1.4 to 2.5 which is higher than influenza virus. The studies across globally stating (R_0) is higher than W.H.O estimations it would be in between 2.2 to 6.49.[27] This basic reproduction rate the pandemic COVID-19 is going to infect millions of humans globally. Vaccination is the most preferrable method. Vaccination against a viral infection is a administration of vaccine to an individual with the intention of immunizing that individual (or) boosting pre-existing immunity but the arrival time of vaccine for COVID -19 is estimated as 6 to 12 months**.** HERD IMMUNITY is a form of protection from an infectious disease that results when a large enough proportion of the population has become immune, conferring indirect protection from infection on individuals who are not themselves immune by safeguarding the humans with COMORBIDITIES.

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