Corona Outbreak

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Abstract- **The corona virus 2019 is a viral disease pandemic all over world. This highly infectious disease was first reported in Wuhan, China, in December 2019. The pandemic resulted in vigorous death in entire world affecting livelihood, depletion in global economy, ultimately beautiful people on Earth.**

INTRODUCTION

COVID19 is a viral pneumonia caused by severe acute respiratory virus. Corona virus is a Coronavirinae from Coronaviridae and Nidovirals. Further they are subdivided into four genera, Alphacoronavirus and Betacoronavirus cause respiratory illness in humans and gastroenteritis in animals, Gammacorona viruses and Deltacorona viruses infect birds, but some may also infect mammals. SARS Coronavirus MERS Coronavirusare two among different types of Betacoronvirus. These both diseases are zoonotic disease. Generally it is SARsr-CoV which is mainly found in bats. The study was published in the Journal of Biological Chemistry. SARS-CoV-2 is an enveloped, single, and positive stranded RNA virus. The virus particles are round or oval in shape, with a diameter about 60–140 nm. S gene, M gene, E gene, and N gene respectively encode four main structural proteins: spike (S), membrane (M), envelope (E), and nucleocapsid (N) proteins. The S protein is a receptor binding site, which is on the viral surface. The M protein shapes the virions, promotes membrane curvature, and is responsible for the transport of nutrients; the E protein plays a role in the assembly and release of virus, and is involved in viral pathogenesis; the N protein can bind virus RNA genome and maintain its stability. Among them, S proteinrecognise virus and binding to host cell surface receptors, and mediating the fusion of virus envelope and cell membrane.
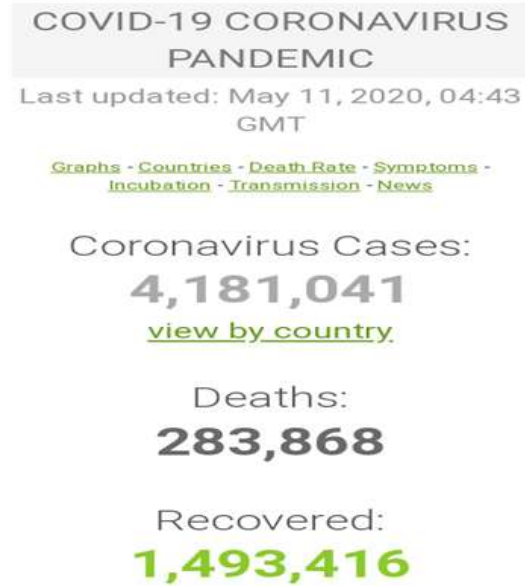
Description:

SARS- COV2 infection occurs basically in two phases like first is immune defense based protective phase and second is inflammation driven damaging phase. In the first, protective phase, it is characterized recruitment of antibody secreting cells, follicular helper T-cells, activated CD4 and CD8. Which makes T-Cells & Immunoglobulin M (IgM) & Immunoglobulin G (IgG), which ultimately binds to SARS COV-2. Next, in second phase which involves damaging phase, uncontrolled cytokine release causing cytokine release syndrome (CRS) or cytokine storm characterized by increase IL2, IL7, granulocyte colony stimulating factor, IFN-gamma and TNF-alpha. Major impact during SARS COV2 is massive alveolar damage occurs leading to acute respiratory distress syndrome (ARDS).

Previous studies have shown, that 4/5 key amino acids of the S protein of SARS-CoV-2 that binds to angiotensin-converting enzyme 2 (ACE2) receptor on the target cells have changed. It was suspected, it may affect the affinity of the S protein to ACE2 receptor, and in turn affect the spread of the virus among the public. However, interaction between the S protein of SARS-CoV and the ACE2 receptor has perfectly maintained in a holistic manner. At present, it has been proved that the binding affinity between the extracellular domain of the S protein of SARS-CoV-2 and ACE2 receptors is about 10–20 times higher than that of SARS-CoV, which may facilitate human-to-human transmission of SARS-CoV-2. Each infected cell produces thousands of novel viral particles that spread to bronchi, eventually reach the alveoli, and extrapulmonary organs, causing pneumonia and targeted organic infections. However, the ACE2 receptor is not only expressed in the respiratory organs. It has been reported that, by using the RNA-seq method to express ACE2 receptors in human tissues, the number of ACE2 receptors expressed in the gastrointestinal tract (high in esophagus, small intestine, and colon, but low in stomach), kidneys, and testes is nearly 100 times higher than that in the lung.

As on date we have,

COVID-19 CORONAVIRUS PANDEMIC

Last updated: May 11, 2020, 04:43 GMT

Graphs - Countries - Death Rate - Symptoms - Incubation - Transmission - News

Coronavirus Cases:

4,181,041

view by country

Deaths:
283,868

Recovered:
1,493,416

ACTIVE CASES

2,403,757
Currently Infected Patients

2,356,722 (98%)
in Mild Condition

47,035 (2%)
Serious or Critical

Show Graph

CLOSED CASES

1,777,284
Cases which had an outcome:

1,493,416 (84%)
Recovered / Discharged

283,868 (16%)
Deaths

Show Graph

COUNTRY	TOTAL CASES	TOTAL DEATH	TOTAL RECOVERY
USA	1385893	81796	262225
SPAIN	268143	26744	177846
RUSSIA	232243	2116	43512
INDIA	71339	2310	23033
ITALY	219814	30739	106587
CHINA	82919	4633	78171

Reported cases and deaths, Last update May 12, 2020.

Diagnostic testing for COVID 19:

Sample derived from nasal swabs and oropharyngeal swab are recommend for diagnostic test. Most common reason for admission was hypoxemic respiratory failure leading mechanical ventilation confirmed positive by reverse transcriptase polymerase chain reaction collected on nasopharyngeal swab. It will be reported positive on admission of lymphacytopenia with a count of 720/cubic mm.

Saliva specimens are collected easily by asking patient to spit into a sterile bottle. Saliva have high concordance rate of >90% with nasopharyngeal specimens. Saliva has been use from the patients without fever and respiratory syndrome.

Sample from lower respiratory tract, including bronchoalveolar-lavage fluid, were collected from patients in Wuhan. Nucleic acids from sample were collected and these nucleic acids were tested for bacteria and virus by polymerase chain reaction.

Report and analysis:

33-year-old woman presented to the hospital with a 5th day history of fever and cough of unknown cause. Laboratory studies showed leucopenia (white blood cell count: $2.91 \times 109/L$). The white blood cell differential count showed 70.0% neutrophils and 0.1% eosinophils. There were elevated blood levels for C-reactive protein (16.16 mg/L; normal range, 0–10 mg/L), erythrocyte sedimentation rate (29 mm/h; normal range, <20 mm/h), and D-dimer (580 ng/mL; normal range, 500 ng/mL). Unenhanced chest CT showed multiple peripheral ground-glass opacities in both lungs that did not spare the subpleural regions. Real-time fluorescence polymerase chain reaction of the patient's sputum was positive for the 2019 novel coronavirus (2019-nCoV) nucleic acid. On the basis of epidemiologic characteristics, clinical manifestations, chest images, and laboratory findings, the diagnosis of 2019-nCoV pneumonia was made. After receiving 3 days of treatment, combined with interferon inhalation, the patient was clinically worse with progressive pulmonary opacities found at repeat chest CT

- Nine pregnant women with pneumonia (SARS-CoV-2) were clinically recorded, tested and examined. We get to know that all the patients had a history of epidemiological exposure to COVID19. The age range was 26-40 yrs while none of the patients had underlying disease. Nine

live birth were recorded no fetal death, neonatal death or neonatal asphyxia was observed. The presence of SARS-CoV-2 was tested in amniotic fluid, cord blood, neonatal throat swab and breastmilk sample collected from six patients none of these showed presence of COVID-19.

- The Korea Center for Disease Control and Prevention and the China Centres for Disease Control, studied the mortality and morbidity rate. Highest morbidity is among individuals in 50-59 yr age. And sex specific ratio is 51% male and 49% female.

- The fatality rate of severe respiratory distress syndrome(SARs) range from 7% to 17% person with underlying medical condition and older than 65years of age had mortality rate. However there was no mortality in children or in adults young than the age of 24 years.

- There are different ways to confirm COVID-19, where saliva testing is the more adequate method. Total 12 patients with COVID19 were examined in Hong Kong. Saliva specimens were collected. Where 11 out of 12 patients were marked as positive.

Treatment:

Plasma therapy is one the best option where the plasma containing antibodies is injected in the patient. This process was also found in vivo study of HIV-1 virus. Chloroquine Phosphate isorally administered (500mg) for adults. [V6] Chloroquine (CQ) and its less toxic derivative hydroxychloroquine (HCQ) are used as treatment for malaria. Chloroquine and hydroxychloroquine have anability to block SARs-COV2 infection at micromolar concentration. Hydroxychloroquine (base) bind to the cell, decrease acidic level of cell and components present in the cell. PH level is increased. Acidic medium is converted to the alkaline medium. Alkaline medium in activate the proper functioning of cell and prohibit the binding of virus. Thus prevent the infection of cell. The combination of hydroxychloroquine and zinc shows more effect as zinc affinity to bind RDRP.

Lopinavir/Ritonavir is an antiviral drug used for the treatment of human immunodeficiency virus (HIV). The enzyme 3-chymotrypsin like protease (3CL) plays important in production of viral RNA.

Lopinavir is protease inhibit the action of 3CL, this disturbs the process of viral replication and release from host cell.

Favipiravin was warranted for treatment of noval influenza on Feb 15, 2020 in china. This drug is currently under trail and testing process. Its action is same as Ramdesivir.

Ramdesivir is effective drug that can be used for the treatment of COVID-19.S-protein of virus, bind to ACE-2 present on cell membrane (host). This Virus, enter into the cell and go through the endocytosis. Release of viral RNA (virus code) takes place. Viral RNA hijack the host cell organelles. Formation of RDRP (RNA dependent RNA polymerase) takes place. RDRP helps in the formation of RNA which increase the number of virus. Ramdesivir bind to the RDRP and inhibit the formation of viral RNA. It is more effective when given with ExoN. These drugs need to test for the further confirmation.
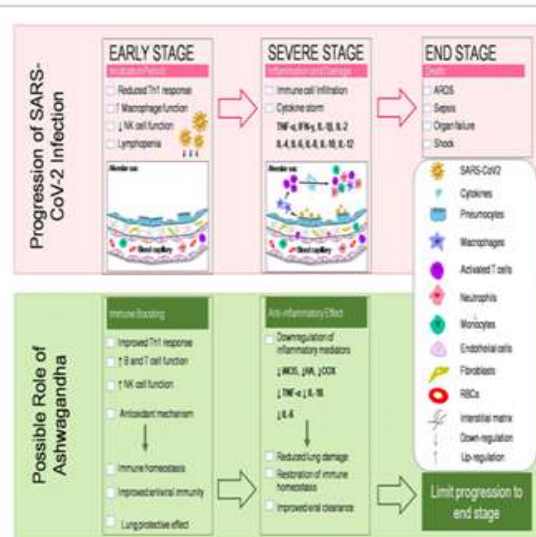

Figure 1. Possible role and immune targets of ashwagandha in prophylaxis of COVID-19. (Top panel) The phases and mediators of immune response elicited by SARS-CoV-2: the early stage (immune-protective phase), severe stage (inflammation/damage phase) and end stage. (Bottom panel) The possible activities of WS on immune mediators during different phases of immune response to SARS-CoV-2.

Along with the Allopathic approach, to some extent prevention and diagnosis is possible with Ayurvedic approach, like having Ginger, Cinnamon, Cardamom tea, Chai with Tulsi or even mint, these all are meant for boosting immune energy. Scientific evidence based on our research spanning over 25 years indicates, that Ayurveda rasayana such as Ashwagandha (Withania somnifera L. Dunal; WS), can be a potential candidate for management of COVID-19. Ashwagandha can offer multi-target effects in inflammatory conditions by restoring

immune homeostasis. Ashwangandha would be an effective agent in the management of COVID-19 through modulation of host Th-1/Th-2 immunity. WS may be beneficial in inducing anti-viral immunity (owing to increased IFN-γ responses) and optimum anti-inflammatory activities (downregulation of IL-1, IL-6, TNF-α and other inflammatory mediators) which are the key targets relevant to COVID-19. In addition, other Ayurveda rasayana such as Tinospora cordifolia (Guduchi), Asparagus racemosus (Shatavari), Phylanthu emblica (Amalaki) etc. also have immune modulatory properties, and may have the potential to bolster health and immunity of the community in the fight against SARS-CoV-2 infection.

CONCLUSON

Restoration of Th1/Th2 response characterized by activated CD4+ and CD8+ response leading to neutralizing antibodies against SARS COV-2 required to eliminate virus and prevent it's progression. It is possible to save millions of lives from SARS COV-2 infection by enhancing host defense system.

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