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CORONA VIRUS DISEASE (COVID-19): HERBAL MEDICINES IN MANAGEMENT AND PREVENTION: A REVIEW

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ABSTRACT

Coronaviruses (CoV) are immeasurable family of viruses that cause sickness ranging from the common cold to more severe viruses such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). 2-14 days represents the present official estimated range for the novel coronavirus COVID-19. There is no formulation have been prepared till now which can be used safe and effective for the treatment of COVID-19. Major 3 types of targets of Coronavirus were identified by researches, which are as follow-1) Inhibit coronavirus at a structural level, 2) Inhibit Coronavirus RNA synthesis and replication and 3) inhibit virulence factor of Coronavirus. Certain herbal medicines like *Tribulus terrestris*, *Withania somnifera*, *Curcuma longa*, *Ocimum sanctum*, and *Phyllanthus emblica* have potent anti-viral (Anti-COV-19) properties against novel Coronavirus, which is indicating new sunrise within the direction of herbal medicine.

KEYWORDS

Corona, SERS-CoV, MERS-CoV, Virion, Respiratory, Viruses, Hcov, Host and RNA.

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INTRODUCTION

Coronavirus disease (COVID-19) is a new strain that was discovered in 2019 and has not been formerly acknowledged in humans. Coronavirus (COVID-19) family of viruses noted for holding stains that doubtless deadly diseases in mammals and birds. The S protein envelope spike is important for coronavirus. The S protein mediates the

Receptor Protein and Membrane Fusion crucial for determining host capacity and transmission. This S-Protein is functionally divided into two domains S1 and S2. S1 domain is responsible for receptor binding and S2 domain is responsible for Cell membrane fusion. Thorough investigations found that SARS-CoV was transmitted from civet cats to humans and MERS-CoV from dromedary camels to Human beings. Several known coronaviruses are socializing in animals that have not yet infected humans. Common signs of contamination include Corona viruses are species in the genera of virus belonging to one of two subfamilies Coronavirinae. Corona viruses can cause multiple system infections in various animals and mainly respiratory tract, gastrointestinal, central nervous system infections in humans, M livestock, avian, bat, mouse and many other wild animals such as Severe Acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)¹⁻³. Since 2002 outbreaks of the Severe acute respiratory syndrome (SARS) and in 2012 Middle East respiratory syndrome (MERS), the possibility of corona virus transmission from animals to human has been proved^{4,5}. There are six known HCoV have been identified, namely HCoV- 229E, HCoV-NL63 (α -coronavirus), HCoV-OC43, HCoV-HKU1 (β -coronavirus), severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) are globally circulated in the human population⁶. In severe cases, especially in elderly, children and immunocompromised patients these four HCOVs can cause life-threatening pneumonia and bronchiolitis^{7,8}. Coronaviruses make up a large family of viruses that can infect birds and mammals, including humans, according to world health organisation (WHO). These viruses are liable for several outbreaks round the world, including the severe acute respiratory syndrome (SARS) pandemic of 2002-2003 and therefore the Middle East respiratory syndrome (MERS) outbreak in South Korea in 2015. Most recently, a completely unique coronavirus (SARS-CoV-2, also referred to as COVID-19) triggered an epidemic in China in

December 2019, sparking international concern. While some coronaviruses have caused devastating epidemics, others cause mild to moderate respiratory infections, just like the cold. Traditional herbal medicines are becoming significant attention in global health debates. India, The United States of America (USA), China, Nigeria, and the World Health Organization (WHO) have all made substantial research investments in traditional herbal medicines⁹.

THE STRUCTURE OF VIRUS¹⁰

S Glycoproteins

Spike (S), in the electron microscope, the type I glycoprotein that forms the peplomers on the virion surface, giving the virus its corona- or crown-like morphology. These are located outside the virion and give the typical shape to the virion. S proteins bind to the virion membrane via the C-terminal transmembrane regions and they interact with M proteins.

M Glycoproteins

The most abundant structural protein in the virion is the membrane (M) protein. It is a small (25-30 kDa) protein with 3 transmembrane domains and thought to give the virion its shape. It has a small terminal glycosylated ectodomain and a much larger C-terminal endodomain that extends 6-8 nm into the viral particle^{11,12}. Despite being co-translationally inserted in the ER membrane. The M protein plays a key role in regenerating virions within the cell. N protein forms a push by binding to genomic RNA and M protein triggers the formation of interacting virions during this endoplasmic reticulum-Golgi apparatus intermediate compartment (ERGIC) with this complex.

E Glycoproteins

The E protein (8-12 kDa) is found in small quantities within the virion. E protein from coronaviruses have common architecture and are highly divergent. These are small proteins composed of approximately 76 to 109 amino acids. Coronavirus E proteins play a critical role within the assembly and morphogenesis of virions within the cell. The membrane topology of E protein isn't

completely resolved but most data suggest that it's a transmembrane protein. The E protein features a N-terminal ectodomain and a C-terminal endodomain and has ion channel activity. The E protein has other functions but also facilitates assembly and release of the virus. The ion channel activity in SARS CoV E protein is not required for viral replication but is required for pathogenesis^{13,14}.

N Glycoproteins

The N protein constitutes the sole protein present within the nucleocapsid. It is composed of two separate domains, an N-terminal domain (NTD) and a C-terminal domain (CTD), both capable of binding RNA in vitro, but each domain uses different mechanism to bind RNA. It has been suggested that optimal RNA binding requires contributions from both domains^{15,16}. N protein is also heavily phosphorylated and phosphorylation has been suggested to trigger a structural change enhancing the affinity for viral versus non-viral RNA. N protein binds the viral genome in a beads-on-a-string type conformation. The TRSs and genomic packaging signal; two specific RNA substrates have been identified for N protein. The genomic packaging signal has been found to bind specifically to the second, or C-terminal RNA binding domain^{17,18}. A 5th structural protein, the hemagglutinin-esterase (HE), is present in a subset of β -coronaviruses. The protein acts as a hemagglutinin, contains acetyl-esterase activity and binds sialic acids on surface glycoproteins. These activities are thought to reinforce S protein-mediated cell entry and virus spread through the mucosa. HE enhances murine hepatitis virus (MHV) neurovirulence¹⁹.

SYMPTOMS OF CORONAVIRUS

The infection causes fever just as respiratory manifestations: dry hack, trouble relaxing. It can also cause diarrhoea and body aches. Symptoms in severe cases include pneumonia, renal failure and even death, consistent with the planet Health Organization. The symptoms of this infection might appear the same as those for a cold or flu, but at this time the Centre for Disease Control and

Prevention's z suggest screening only people who have recently travelled to Wuhan or who have had close prolonged contact with a 2019-n Coronavirus -infected person. The CDC can affirm the infection with an indicative test that it created dependent on the hereditary succession of the infection that Chinese wellbeing authorities acquired and made openly available on Jan. 12. The World Health Organization's Emergency Committee on the coronavirus said during a Jan. 22 news meeting that almost seventy five percent of cases have been in individuals over age 40 and that "cases who passed on - many had huge hidden conditions" like cardiovascular malady and diabetes. In any case, there are affirmed cases in any case sound, youthful people.

Symptoms include

1. Sneezing
2. Runny nose
3. Cough
4. Watery diarrhea
5. Fever in rare cases
6. Sore Throat
7. Exacerbated asthma

Types

The human corona viruses are currently six recognized types that can infect humans. They are;

1. 229E (alpha coronavirus)
2. NL63 (alpha coronavirus)
3. OC43 (beta coronavirus)
4. HKU1 (beta coronavirus)
5. MERS-Coronavirus (Middle East Respiratory Syndrome-Corona virus)
6. SARS-Coronavirus (Severe Acute Respiratory Syndrome-Corona virus)

MERS and SARS this two are more dangerous types

MERS

MERS-Coronavirus, which causes Middle East Respiratory Syndrome (MERS), was first recognized in 2012. This serious respiratory disease previously surfaced in Saudi Arabia and, from that point forward, has spread to different nations. Side effects incorporate fever, windedness, and hacking. The ailment spreads through close contact with

individuals who have just been tainted. Be that as it may, all instances of MERS are connected to people who have as of late came back from movement to the Arabian Peninsula. MERS is lethal in 30 to 40 percent of individuals who contract it.

SARS

SARS-Coronavirus which causes Severe Acute Respiratory Syndrome (SARS), it normally prompted a dangerous type of pneumonia. SARS Coronavirus is one of a kind. It can taint both the upper and lower respiratory tract and can likewise cause gastroenteritis. The side effects of SARS create through the span of a week and start with a fever. At an early stage in the condition, individuals create influenza like manifestations, for example,

- Dry coughing
- Chills
- Diarrhoea
- Breathlessness
- Aches

Pneumonia, a serious lung contamination, may grow a short time later. At its most progressive stage, SARS causes disappointment of the lungs, heart, or liver. During the pandemic, there were 8,098 affirmed instances of SARS with 774 fatalities. This is equivalent to a death pace of 9.6 percent.

HUMAN CORONAVIRUSES

There are seven known strains of human crown infections;

1. Human coronavirus OC43 (HCoV-OC43)
2. Human coronavirus 229E (HCoV-229E)
3. Human coronavirus HKU1
4. SARS-COV
5. Human corona virus NL63 (HCoV-NL63, New Haven coronavirus)
6. Centre as respiratory disorder coronavirus (MERS-COV), recently known as novel coronavirus 2012 and HCoV-EMC.
7. Novel coronavirus (2019-nCoV), otherwise called Wuhan pneumonia or Wuhan coronavirus, (Novel right now newfound, or recently started, and is a placeholder name).

Transmission

Crown infections are zootoxic, which implies they are transmitted among animals and people. They are circling in creatures and a portion of these corona viruses have the ability of transmitting among creatures and people. It is no doubt transmitted through hacking and sniffing, just like the case with flu and other respiratory infections, Corona viruses can spread in the accompanying manners: Coughing and sniffing Crown diseases are zootoxic, which infers they are transmitted among creatures and individuals. Contacting or warmly greeting an individual that has the infection can pass the infection starting with one individual then onto the next. Reaching a surface or item that has the infection and afterward contacting your nose, eyes or mouth. Analysts found that 22 percent had direct introduction to the meat showcase, and 32 percent had contact with individuals who had a fever or respiratory illness.

Diagnosis

Medicinal services supplier may arrange research centre tests on respiratory examples and serum (some portion of your blood) to recognize human crown infections. Research facility testing is bound to be utilized on the off chance that you have serious sickness or are associated with having MERS. In the event that you are encountering indications, you should educate your medicinal services supplier concerning any ongoing travel or contact with creatures. Most MERS- Coronavirus contaminations have been accounted for from nations in the Arabian Peninsula. In this way, revealing a movement history or contact with camels or camel items is significant when attempting to analyze MERS.

Prevention

For the crown infection to forestall covering mouth and nose when hacking and wheezing, disease spread incorporates standard hand washing and furthermore manifestations of respiratory ailment. The World Health Organization has exhorted individuals to keep away from "unprotected" contact with live creatures, altogether cook meat and eggs, and evade close contact with anybody

with cold or influenza like side effects. Standard prescribe a fundamental hand cleanliness, for example, washing your hands with cleanser and water and respiratory cleanliness, for example, when you wheeze, sniffing into your elbow. Approaches to secure yourself against a potential creature source is stay away from superfluous unprotected contact with live creatures and to ensure that you wash your hands altogether in the wake of associating with animal.

Treatment

There are no antibodies or antiviral medications that are affirmed for avoidance or treatment and no particular medicines for crown infections, yet indications can be dealt with. The principle treatment is strong consideration, including ensuring the patient is getting enough oxygen, and utilizing a ventilator to drive air into the lungs if essential, Patients should rest and drink a lot of liquids "while the safe framework carries out its responsibilities and recuperates itself," she said. No medications have been affirmed for any crown infection sicknesses; however an antiviral medicine called remdesivir gives off an impression of being compelling in animals.

Novel Coronavirus (2019-Ncov)

On 31 December 2019, WHO was educated regarding a group of instances of pneumonia of obscure reason identified in Wuhan City, Hubei Province of China? Notwithstanding giving consideration to patients and separating new cases as they are distinguished, Chinese general wellbeing authorities have detailed that they stay concentrated on proceeded with contact following, directing ecological appraisals at the discount market, and examinations to recognize the pathogen causing the flare-up. WHO is intently observing this occasion and is in dynamic correspondence with partners in China. In accordance with standard conventions for any general wellbeing occasion, an occurrence the board framework has been enacted over the three degrees of WHO (nation office, provincial office and base camp) and the Organization is set up to mount a more extensive reaction, if necessary.

How to avoid corona virus

There is no vaccine for corona virus. To help prior steamy shower can also help ease a sore and scratchy throat. Even when a corona virus causes MERS or SARS in other countries, the kind of corona virus infection common in the U.S. is certifiably not a genuine risk for an in any case sound grown-up. On the off chance that you become ill, treat your manifestations and contact a specialist on the off chance that they deteriorate or don't leave.

Where did the infection originate from?

Since the infection previously sprung up in Wuhan in individuals who had visited nearby fish and creature showcase, authorities could just say it likely bounced from a creature to people. In another investigation, in any case, specialists sequenced the qualities of 2019-n Coronavirus (as the infection is presently called), and afterward they contrasted it and the hereditary groupings of in excess of 200 crown infections that contaminate different creatures around the globe. Their outcomes, point by point in the Journal of Medical Virology, recommended that 2019-n Coronavirus likely began in snakes.

How far has the virus spread?

The primary instances of the pneumonia-like infection were accounted for in Wuhan, China on Dec. 31, 2019. Washington State was affirmed to have the infection in the wake of coming back to the U.S. from Wuhan on Jan. 15, turning into the primary case in the U.S., authorities reported on Jan. 21).

Prevention

If travelling to Wuhan, you should avoid contact with sick people; avoid dead or alive animals, animal markets or products that come from animals such as uncooked meat, according to the CDC. You should often wash hands with soap and water for a minimum of 20 seconds, they wrote. If you're infected by the virus you'll take steps to assist avoid transmitting it to others like isolating yourself reception, separating yourself from people in the house, wearing a face veil, covering your hacks and

sniffles and washing your hands, as per the CDC²⁰⁻³⁸.

Effective Herbal Plants against COVID-19

Certain natural products from Indian natural medicines bind to the active sites of COV-19 proteases, hence are likely to hinder viral replication³⁹.

Tribulus terrestris

Tribulus terrestris fruits are documented for his or her usage in pharmaceutical preparations and food supplements. The methanol extract of *T. terrestris* fruits showed potent inhibition against the papain-like protease (PLpro), an essential proteolytic enzyme for protection to pathogenic viruses and bacteria. Major bioactive compounds, aresix cinnamic amides, and ferulic acid were showing inhibition of Papain-like protease (PLpro), which is the major protein target of COV-19⁴⁰.

Withania somnifera

Withania somnifera contains a variety of phytoconstituents like Withanolide A and B, Withaferin A, Withanone, Withanosides⁴¹. *W. somnifera* glycoprotein (WSG) isolated from *W. somnifera* root tubers revealed (protease inhibitor) antimicrobial activity against few bacterial and phytopathogenic virus⁴². *W. Somnifera* would be an effective agent in the management of COV-19 through modulation of host Th-1/Th-2 immunity. *W. Somnifera* may be beneficial in inducing anti-viral immunity (owing to increased IFN-gamma responses) and optimum anti-inflammatory activities (down-regulation of IL-1, IL-6, TNF-alpha and other inflammatory mediators), which are the key targets relevant to COVID-19⁴³. As per the recent molecular docking studies, Withanolide D, Withaferin A, as most appropriate inhibitors against 3C-like main protease (3CLpro), which can be further explored to test against Coronavirus (COV-19) in preclinical and clinical settings⁴⁴. Withanolide-B, Withanone, and Withaferin-A, major phytochemicals of *W. Somnifera* have predicted binding energy lower than the pharmacological inhibitor, N3. The binding of these phytochemicals with the main protease may slow down the cleavage of pseudo-particles (PPs) to

releases non-structural proteins (NSPs) and decrease the process of viral replication and transcription⁴⁵.

Curcuma longa

Curcuma longa contains demethoxy Curcumin, Curcumin, Diacetyl Curcumin⁴⁶, as a major phytoconstituents, which are the most potent compounds that may act as potential inhibitors of COV-19 Main Protein (Mpro)⁴⁷. Curcumin strongly binds to 3CLprotease of COV-19 in comparison to the antimalarial drugs and promote important structural changes in this viral protease, inducing folding of the enzyme⁴⁸. Diacetyl Curcumin present in *C. longa* has been found as more effective on COV-19 (Mpro) than Nelfinavir⁴⁹. Docking studies suggesting that the binding energy of Curcumin (-38.84 kcal/mol) had greater than hydroxychloroquine (HCQ) (-35.87 kcal/mol) in the case of S1 receptor binding domain⁵⁰. As, Curcumin and HCQ interact with the C- terminal of S1 domain with different binding energies⁵¹. Therefore, Curcumin could be used as combination therapy along with hydroxylchloroquine for disrupting the stability of SARSCoV2 receptor proteins.

Ocimum sanctum

Ocimum sanctum extract can be included as a preventive measure against COVID-19 due to its potential to inhibit replication of COV-19 supported with its immune-modulatory feature and ACE II blocking properties. *O. sanctum* containing Tulsinol (A, B, C, D, E, F, G) and dihydrodieuginol-B inhibit COV-19 Main Protease and Papain-like Protease⁵². *O. sanctum* is being used in the management of pain, diarrhea, cough and fever, which are the common symptoms of COV-19⁵³. *O. sanctum* boosts the immunity of the body and helps to defend the threatening virus and bacteria⁵⁴.

Phyllanthus emblica

Phyllanthus emblica also have immunomodulatory properties and may have the potential to bolster the health and immunity of the community in the fight against COV-19 infection 10. Phyllaemblicin-B and phyllaemblinol from *P. emblica* showed a high binding affinity to helicase protein, which is one of

the major targets of COV-19. Phyllaemblicin G7 from *P. emblica* exhibited a high binding affinity to the Spike Protein of COVID-19. The antioxidative and anti-inflammatory properties of *P. emblica* are the key to its therapeutic effect⁵⁴.

CONCLUSION

Millions of people are at severe risk of acquiring several evolving viral infections through several factors. These viruses infect a variety of human and animal host cells and carry out their infection and replication. This article include sign, symptoms, diagnosis of respiratory syndrome and treatment. SARS-CoV and MERS-CoV can be transmitted directly to humans from dromedary camels needs further investigation. The challenge now is to incorporate advance techniques in the investigative efforts done to understand further the biology of Corona virus. Due to work and difficulty are developed vaccines that naturally cover yet have no effective medication that has resulted. There is no specific vaccine or treatment recommended for COVID-19 infection. For severe cases treatment includes ribavirin, interferon alfa and lopinavir/ritonavir are given in combination. But, this is controlled by good personal hygiene, avoid contact with wild animals. Focus on the impact on global stock market. Global stock markets have fallen sharply as investors still worry about the broader economic effects of the coronavirus. Combination therapies of allopath and herbal medicines lead towards the best treatment options. Still, many unknown herbals medicines are waiting for their identification and purification and pharmaceutical evaluation. There is a major research gap between the primary effectiveness of herbal medicine and its clinical trials. Further, research can be carried out on the basis of *in-vitro* and *in-vivo* studies, along with preclinical and clinical reports.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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