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Review Article

Pharmacological Aspects, Role of India and Indian Traditional System of Medicine in Control of COVID-19 Pandemic: A review

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Abstract

India is a country in south asia with world's second most population and seventh largest country by area as well. It shares the borders with more than six country. This fact is enough to understand if the proper early preventive measures would not have taken then COVID19 spread in India would be non stopable by now. COVID19 expanded globally from Wuhan, China which was later declared as pandemic by WHO on 11th, March 2020. If the overall spread and death rates because of this virus will be noted globally India is at seventeenth position as of now, and the reason may be because of early and effective preventive measures taken by the Indian and state government. "Immunity among Indians" may be strong bcause of the consumption of medicinally importamt substances which is consumed in the form of food and spices. Since ancient time Indians are fond of using spices in vegetables and also using traditional medicines as a whole or parts, most of which are having immunity enhancing characteristics. The role of immunity in fighting against any disease is scientifically proven, and in Indian culture mostly everyone, knowingly or unknowingly is consuming the immunizing agents found in the spices and vegetables everyday, which makes them more sunstainable against any disease. And may be this is one of the reason that till today the spreading rate and survival rate in India is more better than other countries. Indians believes in yoga which is also scientifically proven for sound physical and mental health, and hence controlled or normal relaxation of the body by releasing of hormones which is helpful in fighting against various disease.

This review may help the researchers to draw their attention towards pharmacological aspects, Indian spices, yoga, and traditional medicines useful in enhancing immunity, which may further helpful in finding the treatment for COVID19 and other diseases.

Keywords: COVID19; Immunity; Traditional Medicines; Pandemic

Introduction

In December 2019, there was a cluster of pneumonia cases in Wuhan city, China, investigation found that it was caused by a previously unknown virus now named as the Novel Coronavirus. Later the outbreak diseases, COVID-19 (Coronavirus Infectious Disease-2019) was declared as a "Global Pandemic" by the World Health Organization (WHO) on 11th march 2020.

There are several types of corona viruses already reported but the Novel Coronavirus or the principal cause of COVID19 is an evolved or unmapped form of SARS-CoV virus which has several unique characteristics and hence it is also known as SARS- CoV-2. The actual cause of COVID-19 (SARS-CoV-2) is a highly diffusible beta-coronavirus, which is thought to have originated in bats, then spreads to snakes and pangolins, then to humans perhaps by contaminations of meat from wild animals, as sold in china's wet market.

Coronavirus is a member of a family "Coronaviridae". It is a large pleomorphic spherical viruse (120 nm diameter) characterized with bulbous surface projections, positive sense single stranded, enveloped RNA classified under the order "Nidovirales". They consist of four different genera's Alpha, Beta, Gamma and Delta coronavirus. Being an RNA-virus with an RNA- dependent RNA polymerase (RNRP)-based replication they are susceptible to mutation and recombination's and are therefore highly diverse [5].

Before 2019, most people will never have heard of them. But that they have been recognized since 19th century. A group of virologists identified the corona virus and relayed their findings in 1968 to Nature Journal. They compared the characteristics "Fringe of Projections" on the surface of the virus with the solar corona and named them as "coronavirus". Hence the virologists had sun in their mind and not a crown when they chose the name coronavirus.

Together with SARS-CoV, bat SARS-like CoV and others also fall into the genus beta-coronavirus. COVID-19 (caused by 2019-nCoV infection) is classified as a fifth-category notifiable communicable disease in Taiwan on January 15, 2019. The genus beta- coronavirus can be divided into several subgroups.

Types

There are 7 different types of human coronavirus out of 40 different strains [229E, NL63, OC43, HKU1, SARS-CoV, MERS-CoV, SARS-CoV-2 (the novel coronavirus)] vary in how severe the resulting disease becomes, and how far they can spread. They generally cause upper respiratory problems but occasionally can also cause complications in the lower respiratory tract.

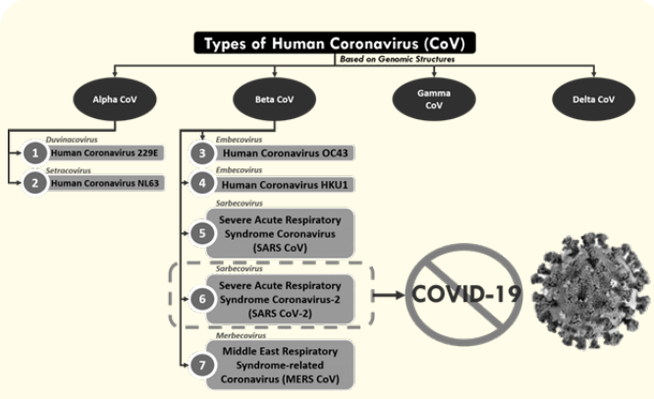

Figure 1: Types of human coronavirus

Life cycle of corona virus

1. Attachment and entry
2. Replicate protein expression
3. Replication and transcription
4. Assemble and release.

Etiology

Experts across the world warn that the disease, which originated in theWuhan district of China in the December of 2019, will only propagate more and the present numbers are likely to inflate further. The sudden outbreak of COVID-19 shook the scientific fraternity, and scientists across the world are working tirelessly to understand the virus and its properties in order to design intervention strategies to combat the disease. So far, we have been able to understand that COVID-19 is caused by a virus known as SARS-CoV-2, which is a "Single-Stranded RNA" virus (ssRNA) with a genome size of 29903 bp. SARS-CoV-2 belongs to the same beta-coronavirus clade of the previously reported SARS-CoV and MERS-CoV and bears sequence similarity to SARS-CoV [1]. In fact, not only do they bear similarity in sequences, but also the entry point of both the viruses in humans is through the same receptor recognition.

The virus SARS-CoV-2 has been speculated to have been transmitted from bats to human considering the fact that evidence of a similar coronavirus, RaTG 13, has been reported in bats [2]. SARS-CoV-2 is made up of three structural proteins, namely, the Spike (S), Envelope (E) and Membrane (M), which makes up the viral envelope, and the nucleocapsid containing the RNA genome. It is the spike protein that carries out the front line action for the virus by performing the initial receptor recognition with the human angiotensin-converting enzyme-2 receptor (hACE2) [2].

Entry route

It is supposed that COVID 19 has core and receptor binding doamain which is capable of identifying hACE 2 in humans to get entered in them. Binding affinity of COVID 19 is more greater than the other corona viruses earlier reported.

It is claimed that this virus mostly target lungs and hence there is chances of severe pneumonia in the patients suffering from this.

Sign and symptoms

Respiratory distress in the patients, specially the aged or those with already pre-existing conditions. SARS-CoV-2 leads to chronic inflammation of the lungs, severe dyspnea, fever, dry cough, and cyanosis and in more vulnerable patients a complete lung failure [3].

It also affects the other organs and their functioning. Recently there are several other sign and symptoms has been included such as less sinsitive taste buds,tiredness,bodyache etc.

People at high risk

1. Those with pre existing diseases are more prone to have this disease. Especially smokers are at the edge since their lung capacity is less than the non smokers.
2. Young childrens.
3. Old age.
4. Pregnant womens.

Current senario in India as on 29/04/2020

- Active Cases- 22629
- Cured/Discharged- 7695
- Deaths- 1007
- Migrated- 1.

Figure 2: Represnting the current situation of Covid-19 in India.

Current senario globally as on 29/04/2020 according to WHO

- Confirmed Cases- 2959929
- Confirmed Deaths- 202733
- Countries, areas or territories with cases- 213.

Figure 3: Represnting the current situation of Covid-19 in World.

If we compare with the debeloped countries India is at the safe side till date and the expansion of this outbreak is comparitvely satisfactory. Enem several districts of India is now corona free, it shows the survival rate of patient is quite good.

In India mostly two types of COVID- 19 is present:

1. L- Strain- Came from Wuhan
2. S- Strain- Came from Dubai.

Death rate of first one is less in comparision to the second.

Important preventive measures

Since there is no vaccine or medicine yet for the treatment of this disease, scientists and researchers are suggesting to take the following preventive measure:

1. Social distancing
2. Use of mask (N99, Surgical, Normal type)
3. Hand wash.

Things to remember under preventive measures

Since there are no standard treatments for COVID-19, it is important to avoid infection or further spreading. For general population, avoid travel to epidemic area of COVID-19. Contact, or eating wild animal is dissuaded. For those who had history oftravel from epidemic area in recent 14 days, body temperature monitor and self-surveillance for 14 days should be performed. If compatible symptoms developed, designated transportationis recommended to prevent unprotected exposure.

For health care workers

- Personal protective equipment should be put on and taken off properly while caring a probable or confirmed patients.
- Stringent protection procedures should be conducted for high-risk procedures (such as Endoscopy, Ambu Bagging, and Endotracheal Tube Incubation).
- Once exposed to blood or body fluids of the patient unprotected, the healthcare workers should flush thoroughly the exposure site by water or soap.
- Afterward, body temperature should be monitored for 14 days.
- The confirmed case should be isolated (prefer a negative pressure isolation room or, alternatively, a single room with good ventilation).
- Under the circumstances of resolved symptoms for 24 hours and consecutive two negative results, isolation could be released.
- Corpses should be burned or buried deep.

Treatment

Treatment includes:

1. Steam and Heat.
2. The virus is susceptible to many active ingredients (AI),: such as sodium hypochlorite (0.1% - 0.5%), 70% ethyl alcohol, povidone-iodine (1% iodine), chloroxylenol (0.24%), 50% isopropanol, 0.05% benzalkonium chloride, 1% cresol soap, or hydrogen peroxide (0.5% - 7.0%) etc.
3. Just like the WHO recommendations for Ebola virus (RG4) disinfection, the environment with spills of blood or body fluids could be cleaned upwith 1:10 dilution of 5.25% house hold bleach for 10 minutes.

Currently, there is no standard treatment for the disease and supportive treatmentwas the only strategy. Although many experimental trials are on the way, the best we can do to prevent a ram-

pant outbreak is stringent infection control operation. Clinicians should consider the possibility of 2019-n CoV virus infection in persons with travel or exposure history with compatible incubation period and presenting symptoms. First-line health care providers should be highly aware of appropriate infection prevention measures for suspected patients.

The main strategies are symptomatic and supportive care, such as keeping vital signs, main taining oxygen saturation and blood pressure, and treating complications, such as secondary infections or organs failure.

Because of the potential mortality of COVID-19, many investigational treatments are underway:

1. **Remdesivir:** The experimental drug is a novel nucleotide analogue pro drug in development by Gilead Sciences, Inc. It is an unapproved antiviral drug being developed for Ebola and SARS. In a case report on the first case of 2019-n CoV in the United States administering remdesivir for compassionate use on day 11 after illness resulted in decreasing viral loads in nasopharyngeal and oropharyngeal samples and the patient's clinical condition improved [5]. However, randomized controlled trials are needed to determine the safety and efficacy of this drug for treatment of patients with 2019-n CoV infection.

2. **Convalescent therapies (Plasma from recovered COVID-19 patients):** This strategy had been used to support passive immunization. Based on the studies from MERS, the therapeutic agents with potential benefits include convalescent plasma, interferon-beta/ribavirin combination therapy, and lopinavir [6]. However, there are no experience on COVID-19 and no randomized controlled clinical trials for this managementat present.

3. **Antiviral Drugs:** Lopinavir/ritonavir and ribavirin had been tried to treat SARS disease with apparent favorable clinical response [7]. *In vitro* antiviral activity against SARS-associated coronavirus at 48 hours for lopinavir and ribavirin was demonstrated at concentrations of 4 and 50 μg/mL, respectively. A recent report found uncanny similarity of unique insertions in the 2019-n CoV spike protein to HIV-1 gp120 and Gag [8]. Will anti- HIV drugs affect the 2019-n CoV treatment outcome? Further randomized controlled trials in patients with COVID-19 are mandatory.

4. **Vaccine:** There is currently no vaccine available for preventing 2019-n CoV infection. The spike protein may serve as a vaccine candidate, but the effect to human requires further evaluation.

5. **Anti malarial drug:** The effect to human requires further evaluation.

Considering all the facts we can say that immunity plays a vital role against fighting with all diseases and hence may be because of spices and vegetables used by the Indians are turning into compa-ritvely less expansion and more survival rate from this virus.

India has put the efforts not only to control this virus in India but globally extending his helping hand in terms of medicines, finance or motivation. Several corona winning models in few states of India are accepted and appraised by the developed countries.

Immunity enhancer traditional foods [9] and spices [10]

Food	Constitution	Function
Citrus Fruits	Vitamin C	Increases the number of WBC, the key to fight against infections.
Red Bell Pepper	Vitamin C Carotene	Maintain good health of eyes and skin.
Broccoli	Vitamin A, C and E Antioxidants Fibers	Maintain overall body health as it is supercharged with minerals and vitamins
Garlic	Allicin (Sulfur-containing compound)	Lower down Blood pressure and also slows down the hardening of arteries.
Ginger	Gingerol	Eliminate Inflammation, reduce chronic pain, and decreases cholesterol.
Green tea	Flavonoids Amino acid L-thiamine	Maintain the fighting ability of T-cells Boost metabolism
Papaya	Vitamin B and C Potassium and folate Papain (digestive enzyme)	Beneficial to overall health
Milk	Protein Calcium, Vitamin A	Repair body tissues Maintain health of bones Keep eyes and skin healthy
Yogurt	*Lactobacillus acidophilus*	Fight with bacteria
Oysters	Protein	Increase production of cytokines
Flax seeds	Omega 3 fatty acid	Increase HDL and cholesterol
Amla	Vitamin C	Boost Immunity
Sweet Potato	Beta Carotene	Increase t-cells and NK cells.

Table 1: Immunity enhancer food supplements.

Spices	Content	Benefits
Turmeric	Antioxidants	Decrease exercise-induced muscle damage.
Chilli (Lal Mirch)	Antioxidants	Help to cope with cholesterol, burn calories
Cinnamon (Dalchini)		Natural production of insulin and reduces blood cholesterol
Clove (Laung)		Tooth ache and sore gums. It is also beneficial remedy for chest pains, fever, digestive problems, cough and cold.
Coriander (Dhaniya)		Coping with soar throat, allergies, digestion problems, hay fever etc.
Cumin (Zeera)		Dysentery.
Fenugreek (Methi) Bishop's weed (Ajwain)	Iron	Keeps immune system healthy, treating diabetes and lowering cholesterol. Used in GI ailments including: diarrhoea, dyspepsia, flatulence, indigestion and cholera. In Ayurvedic medicine it is used as an antiseptic, preservative, respiratory and GI ailments. Unani system of medicine as an enhancer of the body's resistance.
Nutmegh		Treatments of asthma, heart disorder and bad breath.
Pepper (Kaali Mirch)		Helps coping with cold, cough, infections etc. It helps to deal with muscle pains and digestive problems
Saffron (Zaffran/Kesar)		Helps to cope with skin diseases.
Star anise (Chakra Phool)		Beneficial for rheumatism

Table 2: Immunity enhancing spices.

Conclusion

Covid19 is a pandemic which is now a days treated as a killer virus. Since there is no known treatment yet, preventive measures playing a vital role and it is indeed working in terms of restricted the expansion of COVID19 in most of the countries. India has taken the preventive measures on time and the result is good if compared to the other European countries or those who had taken the preventive measures too late. Few literatures and scientists claimed that the Indian foods and spices consumption may be one of the reasons that the spread of this virus is slow in India, since these foods and spices has great medicinal values it may be useful in enhancing the immunity among Indians. In various religious books, vedas, and shastra has claimed the value of these foods and spices in the treatment of several ailments and also in strengthening the immunity. On another hand Indians are having practices of yoga in early schools which may also one of the reasons behind the strong immune system. Yoga and its scientific aspects in sound mental and physical health is now accepted globally, and hence during this pandemic yoga practices may helpful in fighting against COVID 19 directly or indirectly. The purpose of this review is to draw the attention of researchers for exploring the scope for new formulation or drugs by extensive research on Indian system of medicine, foods, spices and yoga, etc which may also be helpful in the treatment of such communicable diseases. The policies implemented by the Indian government to control the expansion of COVID 19 and improvement in survival rate in patients with this disease may also be helpful for other countries and hence must be analyzed.

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