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Herbal Plants: An Alternative Therapy To Combat Immunity Disorders & Covid-19

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ABSTRACT:

COVID-19, a worldwide epidemic, is afflicting the whole planet. Vaccines have been developed; however, they will not be able to eliminate the COVID-19 virus. As a result, the only approach to address the problem is to the disease is to have a robust immune system. A well-balanced diet can help enhance immunity, which is necessary for preventing and treating viral illnesses. Vitamins A, C, and D and minerals like Selenium and Zinc found in fruits, herbs, and vegetables have been demonstrated to have beneficial immunity-enhancing effects in viral respiratory infections. In this publication, we have attempted to describe the advantages of medicinal herbs, vitamins, minerals, nutraceuticals, and probiotics in combating the new Coronavirus. The dietary concept based on existing evidence might help inhibit and regulate COVID-19.

KEY WORDS: Immunity, COVID-19, Vaccines, Immunotherapy, Herbal plants

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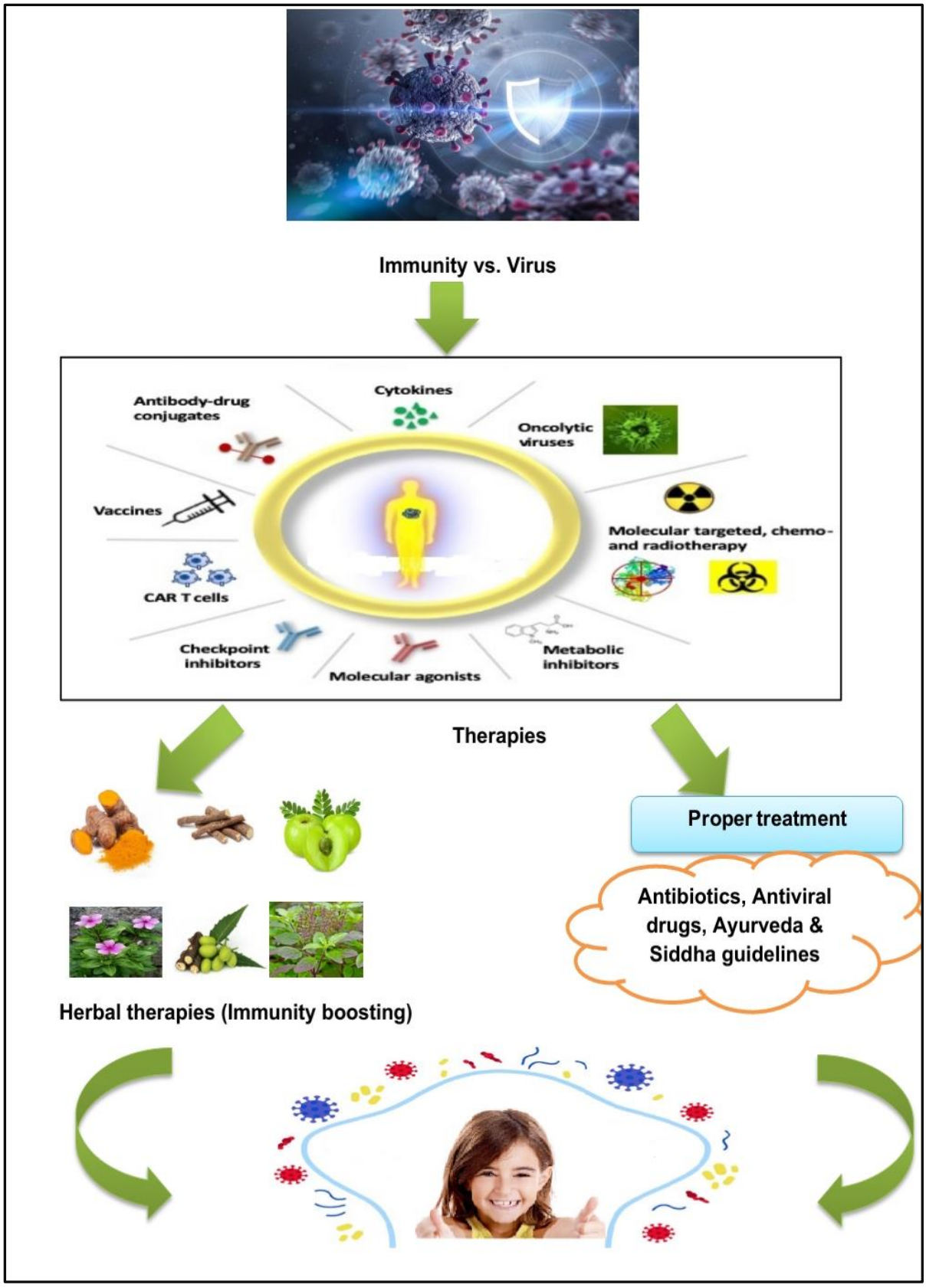

GRAPHICAL ABSTRACT

INTRODUCTION:

The systematic study of viruses and the infections they produce began around the turn of the twentieth century. Louis Pasteur and Edward Jenner created the first vaccination against viruses, but viral research was limited at the time.[1] When the Ebola virus was initially being identified in 1976 and spread across Africa, the human race had given the virus little thought. From that time till now, virology has been a top focus for scientists. The mid-twentieth century was a critical period for vaccine development. Various ways for manually growing viruses in the laboratory resulted in quick discoveries and advancements, including polio vaccinations.[2] However, in 2003, a new viral illness known as "SARS" struck the world once more, affecting China and the rest of the world. According to the World Health Organization (WHO), SARS was the first highly infectious new disease to emerge in the twentieth century, with a case fatality rate of 3%. SARS coronavirus (SARS-CoV) of the second series was declared eradicated by the WHO in July 2003.[3] But not long after that, in 2012, a new virus known as MERS was discovered in a Saudi Arabian resident for the first time.

Humanity is being forced to confront the unfinished problem in 2019. SARS-CoV-2 has infected many individuals in a short period, not just in Asia but around the globe. Various nations, including Germany, the United States, Japan, the United Kingdom, and Russia, are actively working on vaccine development; nevertheless, time is necessary for this study. Even though the vaccine has been developed, the underlying issue has yet to be resolved.[4] We live in a world where there are many different kinds of people. Many kinds of people—unknown chemicals and agents harmful to our bodies, such as viruses, bacteria, and other pathogens. Our bodies, on the other hand, contain an infection-prevention defensive system.[5] Whether it's the Ebola virus, SARS, MERS, or COVID-19, our bodies' immune systems are heavily involved in fighting them. This is the human race's history up to this point.

The herbal study is a long-standing discipline that focuses primarily on the use of herbal plants and extracts. Even though Sumerians mentioned medicinal plants (caraway, Laurel, and Thyme) and their therapeutic usage over 5,000 years ago,[6] it is widely assumed that herbal medicines are normal/natural and so free of significant adverse effects and are less prone to cause habituation.[7] Herbal plants are used by 60 to 70% of cancer patients, according to research.[8] According to a survey conducted in the United Kingdom, at least 35% of patients have previously visited herbal remedy practitioners.[9] According to research conducted in Canada, 20% of breast cancer patients had sought at least one herbal medicine therapy in the past.[10] However, study surveys conducted in the United States have consistently shown values above 55%.[11] Herbal research is ongoing, intending to reduce sickness caused by the Coronavirus. Plants have been examined extensively worldwide due to their notable pharmacological actions in specific species and their beneficial effects on humans. Sulphur-containing compounds, flavonoids, tannins, alkaloids, phenolic compounds, and other secondary metabolites are found in many plant species.[12]

Siddha, Unani, Ayurveda, yoga, homoeopathy, and naturopathy are among the six systems of medicine recognised in India. There are around 30,000 herbal plants known. Because there were few treatments for COVID, the epidemic brought the globe to a tragic disaster. Individuals should have a stable and conspicuous immunity to protect themselves from SARS-CoV-2. The Indian government has published an advising notice regarding using herbal items such as Curcuma longa, Zingiber officinale, Allium sativum, Ocimum sanctum, and Nigella sativa in the preparation of dishes at home during this pandemic. It is recommended that you drink a herbal decoction or herbal tea prepared with basil, cinnamon, pepper, and ginger at least twice a day. Twice a day, 12 tablespoons of turmeric in 100 mL hot milk are advised.[13] Many medicinal herbs, such as Allium sativum (garlic), Tinospora cordifolia

(Giloy), Ocimum basilicum (Tulsi), and others, are commonly regarded as immune boosters with antiviral capabilities.[14]

The epidemic currently afflicting the whole planet is no longer a simple issue, and the third wave has already resurfaced in India with lethal mutant Coronavirus. The human species as a whole must protect itself, and each individual must take responsibility for fighting the virus by safeguarding themselves and boosting their immunity to breaking the cycle. The current article identifies numerous herbal indigenous plants that show immunity-boosting and the critical role of the immune system in helping us fight the Coronavirus. Table 4 is a list of antiviral properties of typical herbal plants. As a result, we have depicted the importance of indigenous herbal plants, immune response to COVID-19, immunotherapies for viral infections, COVID statistical analysis, and especially the importance of various herbal plants from India in enhancing natural immunity as well as antiviral properties in the current review article.

2. Data-gathering methodology:

The piloted literature study included publications published between January 1, 2015, and August 30, 2021. Nature.com, PubMed, Springer Nature, and WoS were the online research databases utilised to double-check publications. To find the present review paper, a multi-query search approach was used. The outputs were chosen after extensive research and analysis of the numerical outcomes obtained and their relevance. The search queries used and the numerous texts identified by each data source are depicted in Table 1. For the passive pursuit by keywords, title, and abstract, the whole catalogues of the included articles were physically crisscrossed. Manuscripts with the following characteristics in the abstract or title:

3. Discussion: Medicinal herbs have a lot of power to boost the immune system in people and protect them from COVID -19 and other viral diseases. An immune response is an effective self-defence system that fights and defends the host against various diseases. The immune response includes both innate and adaptive immunity.[12] Immunological defence entails a delicate balance of humoral and cellular responses. T-lymphocytes or B-lymphocytes are the main targets of immunostimulants and increased macrophage phagocytosis, which plays an essential role in immunity stimulation. The crucial function in activating T-lymphocytes is most likely accomplished by introducing various bioactive chemicals from herbal plants.[15]

COVID-19 enters people in a variety of ways.

SARS-CoV2 is inhaled and binds to the nasal epithelium's ciliated secretory cells through ACE-2. The virus replicates and spreads locally in around one-fifth of all patients, despite a weak immune response. The conquest and infection of Type-II Pulmonary alveolar epithelium cells are caused by the participation of the trachea, superior respiratory tract, and migration into the inferior respiratory tract via ACE-2. Infected cells create interferon to notify the immune system, and they employ MHC molecules to indicate to the immune system what they're up against. To resist infection, a cytokine storm develops and chemo-attraction for neutrophils, CD4 and CD8 cells, and B cell development. T lymphocytes kill infected cells, whereas B lymphocytes produce antibodies that destroy viruses in the environment. Due to the release of viral particles and the persistence of infection of healthy alveolar epithelial cells, viral replication causes death in host cells, resulting in the elimination of Type-I and Type-II pneumocystis. With ARDS, the host's resistance and attempts at viral clearance result in the spread of alveolar damage.

COVID-19 statistical analysis in India and throughout the world:

As of July 3, 2021, India had recorded nearly 30 million COVID-19 cases, 3 million retrievals, and 4,20,000 deaths. Following the management of the first wave, India was granted the most remarkable statistics of unique strains and deaths since April 2021 due to the continuing 2nd wave.[16] COVID-19's explosion had conformed over the planet as of July 9, 2021. The virus has infected about 186 million people worldwide, with a mortality rate of around four million. The most severely affected countries are the United States, India, and Brazil.[17] As of July 9 2021, there have been 18,63,58,041 COVID-19 instances registered throughout the world.

Preventative measures include:

1. Immunotherapy:
a) CAR T-Cell Therapy
b) Vaccines Covid-19
2. Herbal Plants with Immunomodulatory Properties

1. Immunotherapy:

What is Immunotherapy, and how does it work?

The immune system is either activated or suppressed in this therapy for diseases. Immunotherapies that trigger an immune response are called activation immunotherapies, while immunotherapies that repress immunological responses are called suppression immunotherapies.

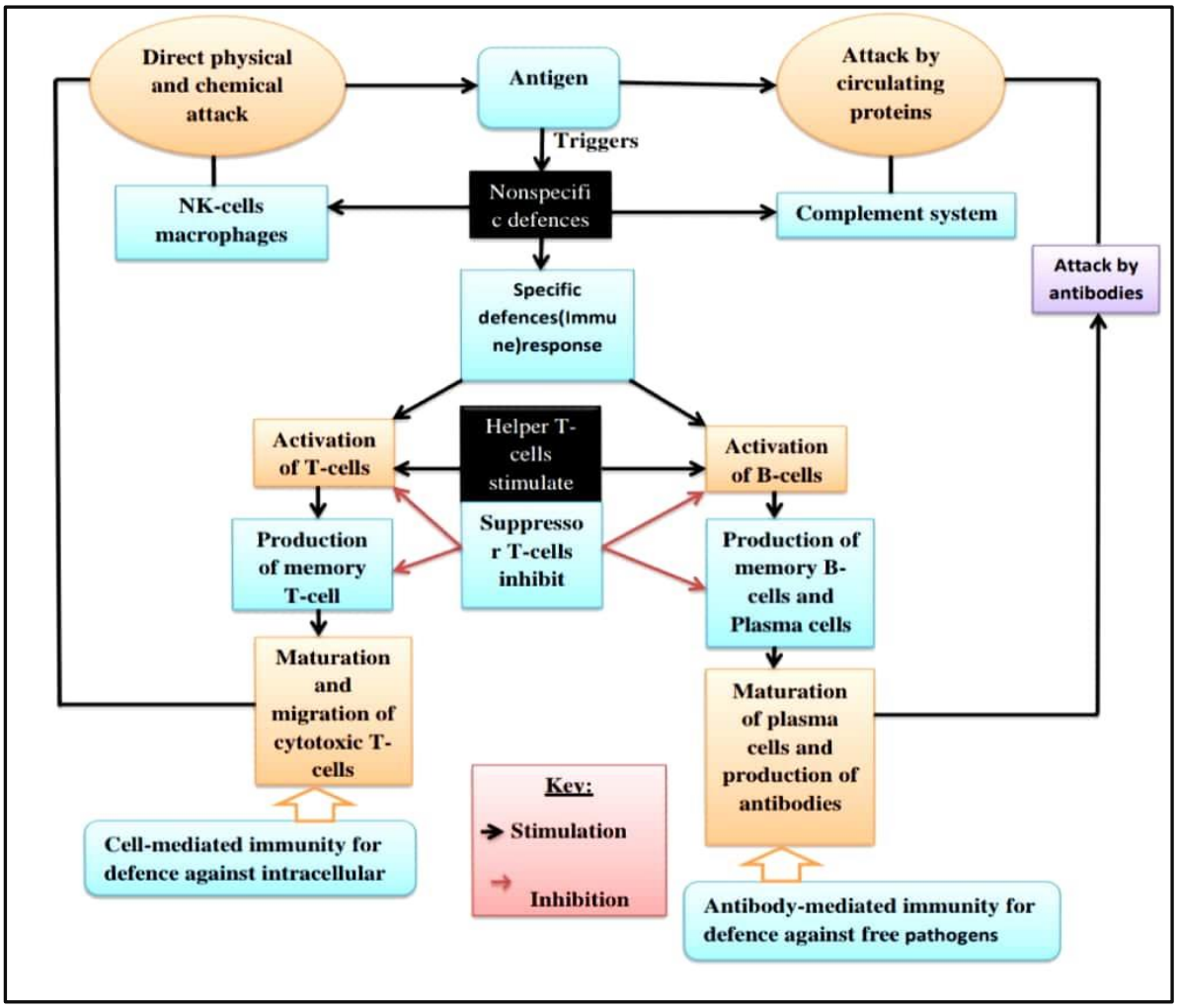

Fig. 1 Immune response to a disease-causing microorganism

The technique for chimeric antigen receptor T-cell treatment (CAR) is depicted in the figure above. Immunotherapy is one of the most widely utilised approaches for cancer diagnosis. As a result, T-cells that can recognise and battle contaminated cancer cells in the human body are created. The steps are as follows:

1.T-cells (represented by the letter 'to) are separated from the patient's blood.
2. In the laboratory, the gene that codes for the individual antigen receptors is introduced into T-cells.
3. CAR receptors (abbreviated as 'c's) are generated on the cell surface.
4. In the laboratory, the newly changed T-cells are further cultured and developed.
5. The genetically modified T-cells are then injected into the patient's body.[18]

b) Vaccines for COVID-19:

How does the COVID-19 vaccination work? A comprehension Vaccinations are a type of Immunotherapy, and COVID-19 vaccines help the human body build up immunity to battle COVID-19. Vaccines of various types function in a variety of ways to provide protection. On the other hand, different vaccinations allow the body to produce "memory" T-lymphocytes, which prepare our bodies to fight the virus if we become sick. After immunisation, the body takes typically 2-3 weeks to create B- and T-lymphocytes. As a result, a person might become infected with COVID-19 just before or after immunisation and become ill due to insufficient time provided to the vaccine that protects our bodies. The process of establishing immunity following vaccination can sometimes cause symptoms like fever, headache, or chills. These clinical symptoms imply that our bodies are strengthening their immune systems.[19]

Vaccine types include:

COVID-19 vaccines are used all over the world to achieve the same goal: protection against COVID-19. Different technologies are used in the vaccines; some are made from the entire SARS-CoV-2 virus, while others are made from parts of the virus, and still, others do not use any virus-derived materials.

Messenger RNA, or (mRNA), is a heritable factual that specifies how proteins are made. The vaccine comprises total mRNA enfolded in a coating that makes it simpler to distribute and protects the body from harm. The mRNA in the injection makes it easier for the body's cells to create spike protein. When the COVID-19 virus is evident, our bodies will detect it and fight it.

B) Virus-related vector vaccines:

Virus-related vector vaccines, like (mRNA) injections, do not include the entire (SARS-CoV-2) virus; instead, they give a harmless viral genetic component that allows human cells to manufacture the spear protein.

C) Subunit vaccinations:

Sub-vaccines, like (mRNA) and virus-related vector inoculations, have a fraction of the (SARS-CoV-2) virus. Even though cells are given genetic instructions to make spikes, subunit vaccinations deliver the protein straight to the cells.

D) Vaccines that have been inactivated:

Disabled vaccinations, unlike the injections mentioned earlier, contain the whole (SARS-CoV-2) virus. Because the disease is reactively inactivated, it does not produce illness. During the statewide immunisation programme in India, two licenced vaccines, Covaxin and Covishield, are currently being utilised.[20] Covaxin is an inactivated vaccine, whereas Covishield is a viral vector vaccine.

Vaccination statistical analysis in India:

As of August 28, 2021, India had distributed 554 million vaccination doses for the pandemic virus (COVID-19).[21] According to today's census, all age groups over 18 should be vaccinated by December 31, with an average of 8.39 million doses delivered daily. As of August 28,[22,23] just 10.3 per cent of India's population had received their entire vaccination, while 43.8 per cent had received their first dose.

Vaccination in different parts of the world:

Over (5 billion) viral vaccination dose forms had been directed globally as of August 28, 2021, with India accounting for about 45.7 crores of that total. Approximately 1 billion individuals, or 25.8% of the population, are completely vaccinated. As of August 28, 2021, the data below shows the number of vaccine dosage forms controlled globally per nation.

The path to recovery:

Coronavirus combat is a judgmentally important cause of death for a small number of people; the virus's influence can induce illness or even death. Vaccination is a one-of-a-kind approach to protect yourself and others from COVID-19.[24] However, when disease-causing microorganisms enter our bodies, our immune system is triggered and begins to fight them. However, when the severity of the condition worsens, our immune system begins to weaken, necessitating the diagnosis and improvement of our immune system using immunity boosting herbal plants.

A symptom-specific strategy in COVID-19,:

The therapies for mild and moderate symptoms shown in Table 5 are recommended by the government of India's (AYUSH) Siddha recommendations for treating COVID-19.[25]

Abbreviations:

- COVID: Corona Virus Disease
- SARS: Severe Acute Respiratory Syndrome
- WHO: World Health Organisation
- MERS: Middle East Respiratory Syndrome
- WoS: Web of Sciences
- SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2
- ACE-2: Angiotensin-Converting Enzyme 2
- MHC: Major Histocompatibility Complex
- ARDS: Acute Respiratory Distress Syndrome
- CD4 & CD8: Cluster of Differentiation 4 & Cluster of Differentiation 8
- CAR: Chimeric Antigen Receptor
- mRNA: Messenger Ribonucleic acid
- TCM: Traditional Chinese Medicine

- HSV 1 & HSV 2: Herpes Simplex Virus 1 & Herpes Simplex Virus 2

3. Discussion:

Medicinal herbs have great potency to augment the immune system in humans for the protection against COVID -19 and other viral infections. An immune reaction is a major self-defense mechanism which fights and defends the host from several pathogens. An innate and adaptive immunity are part of immune response.[12] Immunological defense is complex interpretation between humoral & cellular responses. Principal targets of the Immune-stimulants are T-lymphocytes or B-lymphocytes, elevated phagocytosis by the macrophages; it plays a major part in immunity stimulation. The vital role in prompting the T-lymphocytes, that is probably attained by introducing various bio-active compounds from herbal plants.[15]

How does COVID-19 enter inside humans?

The inhaled SARS-CoV2 is bonded to the ciliated secretory cells in the nasal epithelium via ACE-2. In about 1/5th of all patients, the virus replicates and local propagation with a limited immune response. The involvement of the trachea, superior respiratory tract, and migration into the inferior respiratory tract leads to the conquest and contagion of the Type-II Pulmonary alveolar epithelium cells via ACE-2. The infected cells produce interferon to alert the immune system and use molecules called MHC to show the immune system what is infecting them and release Cytokine storm, Chemo-attraction for Neutrophils, CD4 and CD8 cells along with B cell differentiation occurs to resist the infection. Here, T Lymphocytes eliminate infected cells whereas; B Lymphocytes release antibodies that neutralize circulating viruses. Viral replication results in apoptosis of host cells due to the release of viral particles and on the continuation of infection of healthy alveolar epithelial cells, with loss of both Type-I and Type-II pneumocystis. Host defense and attempt of viral clearance lead to the diffusion of alveolar damage with ARDS.

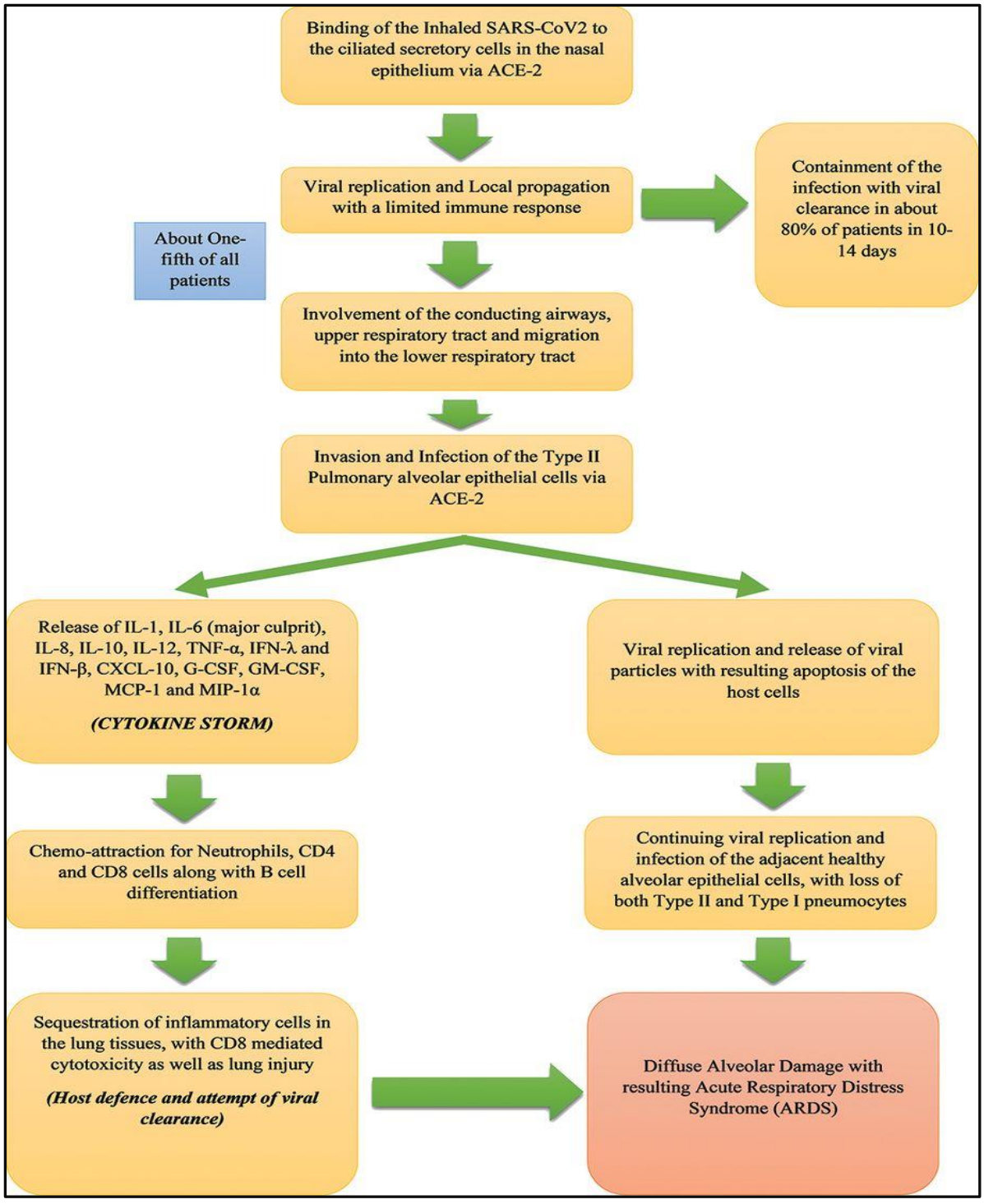

Fig. 2 Pathophysiology of COVID-19

Statistical analysis of COVID-19 in India and worldwide:

India has reported over 30 million COVID-19 cases as of July 3, 2021, around 3 million retrievals and roughly 4,20,000 mortalities. Subsequently the first wave was managed, India was conceded the highest statistics of novel strains & demises observed since April 2021 as a result of the ongoing 2nd wave.[16]

As of 9 July 2021, the outburst of COVID-19 had conformed around the world. The virus had diseased over 186 million individuals throughout the world, and the fatality rate had touched around four million. The utmost sternly affected nations USA, India & Brazil.[17] The number of COVID-19 cases reported around the world as of 9 July 2021 was 18,63,58,041.

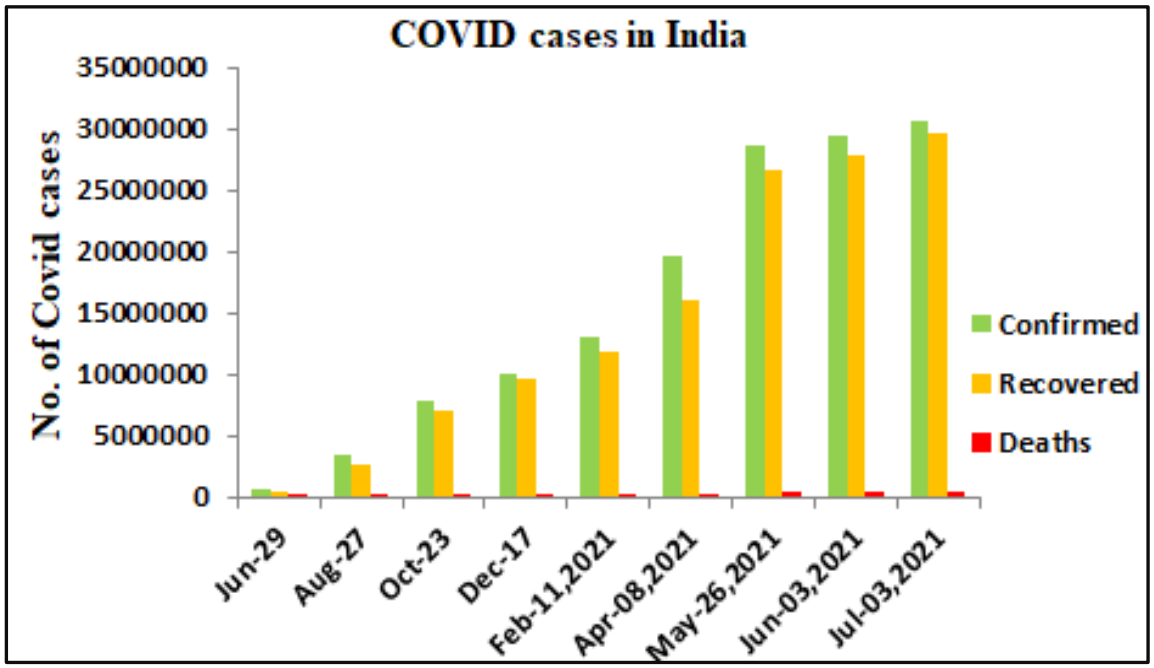

Fig. 3 Statistics of the COVID-19 cases confirmed, recovered, and fatality numbers across India from June-2020 to July 2021.[17]

Preventive measures:

1. Immunotherapy:
   a) CAR T-Cell Therapy
   b) Covid-19 Vaccines
2. Immunomodulatory Boosting Herbal Plants

1. Immunotherapy:

What is Immunotherapy?

This is the treatment for the disorders by either initiating or suppressing the immune system. Therapies of immunity are considered to activate an immune response known as activation immunotherapies, whereas immunotherapies that reduce immune responses are known as suppression immunotherapies.

a) CAR T-Cell Therapy:

The above diagram depicts the procedure of chimeric antigen receptor T-cell therapy (CAR), Immunotherapy is one of the methods used extensively in diagnosing cancer. As a result, equipped T-cells are produced to identify and combat the infected cancer cell in the human body. The steps are:

1. T-cells (represented as ‘t’) are detached from the patient's blood.

2. The gene that encodes for the specific antigen receptors is incorporated into the T-cells in the laboratories.
3. On the surface of the cells CAR receptors(represented as 'c') are produced.
4. The freshly modified T-cells are additional cultivated & developed in the laboratories.
5. Subsequently, the genetically engineered T-cells are instilled into the patient's body.[18]

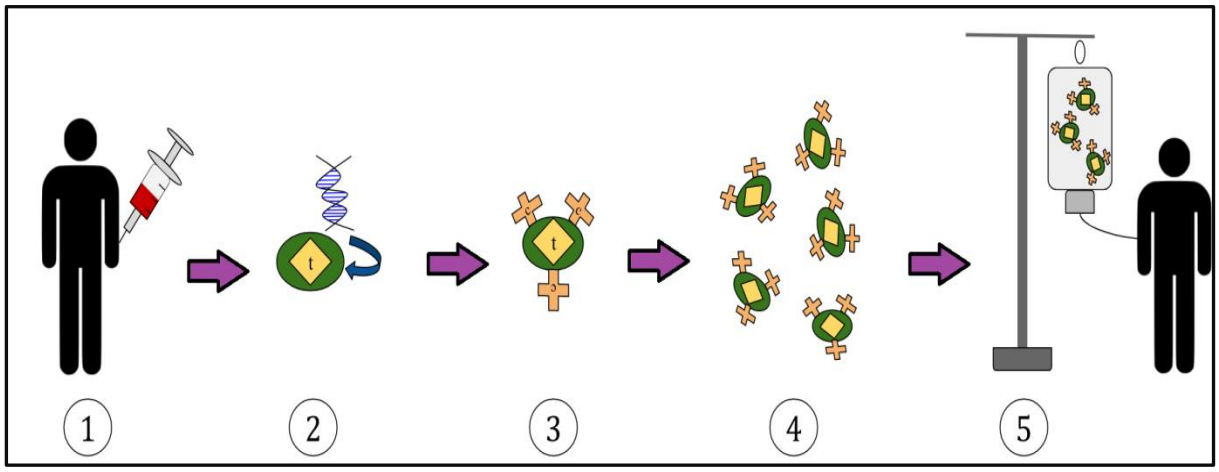

Fig. 4 Process of CAR T-cell therapy

b) COVID-19 Vaccines:

How COVID-19 vaccines works? An understanding

Vaccines are a part of Immunotherapy; COVID-19 vaccines support human bodies to improve immunity to combat COVID-19. Diversified kinds of vaccines act in various ways to depict protection. However, different kinds of vaccines enable the body to supply "memory" T-lymphocytes that prepare our body to combat the virus if individual get infected. It usually takes 2-3 weeks for the body to produce B- & T-lymphocytes after vaccination. Therefore, just before or after vaccination a person could likely be infected with COVID-19 and then gets sick due to insufficient time given to vaccine that offers protection to our body. Sometimes after vaccination, the process of building immunity can root symptoms, such as fever, headache, or chills. These clinical signs indicates that our body is building immunity.[19]

Types of vaccines:

COVID-19 vaccines are administered all over the world to attain the same target, that is, defense from COVID-19, by engaging different technologies in the vaccine, some vaccines are constructed from whole SARS-CoV-2 virus, while some are constructed utilizing the part of the virus and some do not use any derived materials of the virus.

A) RNA Vaccines:

Messenger RNA or (mRNA), is the heritable factual that states the build proteins. The vaccine is of complete mRNA enfolded in a layer that enables distribution easier and protects the physique from damage. The mRNA in the shot simplifies the cells of the body to prepare spike protein. Later when visible to the COVID-19 virus, our body will recognize and combat it off.

B) Virus-related vector vaccines:

Similar to (mRNA) injections, the virus-related vector vaccines do not comprise the complete (SARS-CoV-2) virus; also deliver a innocuous viral genetic factor that permits our cells to produce the spear protein.

C) Subunit vaccines:

Similar to (mRNA) and virus-related vector inoculations, sub-vaccines also habit a portion of the (SARS-CoV-2) virus. Nevertheless, cells are provided with hereditary code to produce spikes, subunit vaccines deliver the protein directly.

D) Inactivated vaccines:

Distinct from the above-mentioned injections, disabled vaccines comprise the whole (SARS-CoV-2) virus. The disease is reactively inactivated; hence does not cause any disease.

In India, currently two approved vaccines, Covaxin and Covishield are being used during the nationwide vaccination drive. Covaxin is a kind of inactivated vaccine while Covishield is a kind of viral vector vaccine.[20]

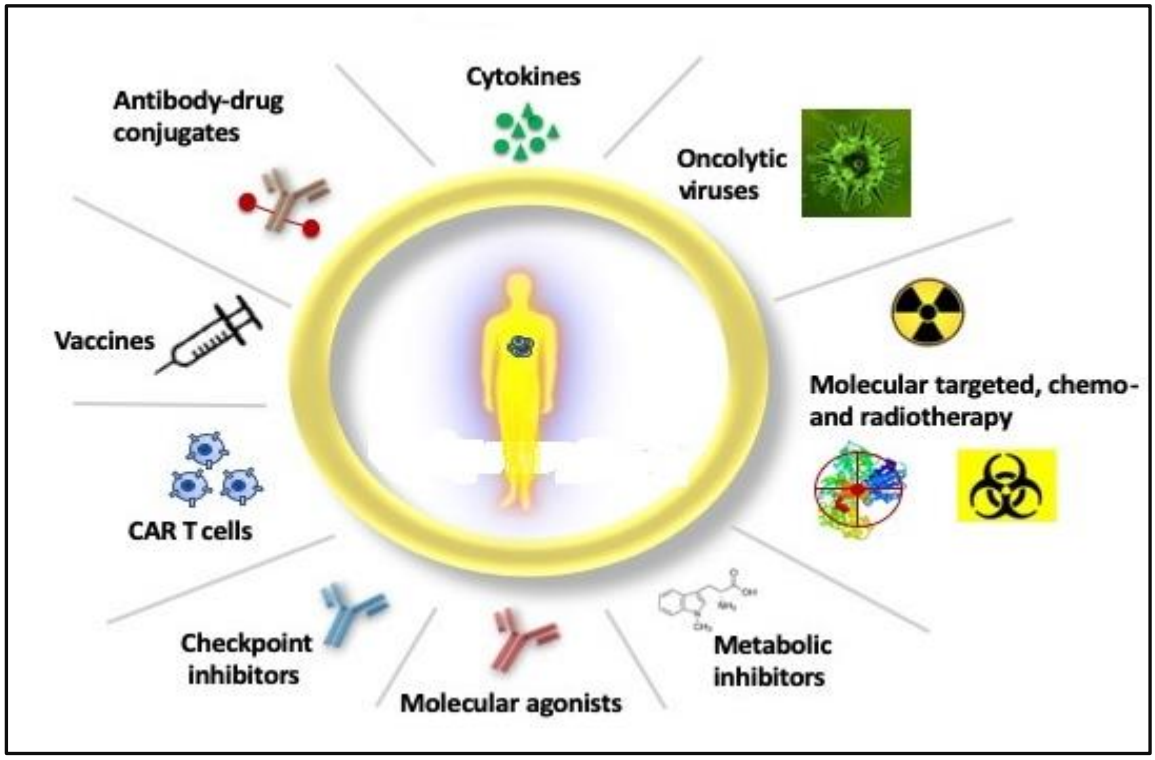

Fig. 5 Types of immunotherapies

Statistical analysis of vaccination in India:

India directed over (554 million vaccine) dosages for the pandemic virus (COVID-19) as of 28 August 2021.[21]

According to today's census by 31st December it is targeted to vaccinate all age groups above 18, on average 8.39 million doses should be administered daily. Only 10.3% of the population in India was fully vaccinated, while 43.8% had received their first dose as of August 28.[22,23]

Vaccination around the world:

As of 28 August 2021, over (5 billion) viral vaccinating dosage forms, had been directed globally, India office for nearly 45.7 Crores of this whole. About 1 Billion people are fully vaccinated, that is, 25.8% of the population. The data below displays the total number of vaccine dosage forms managed globally as of 28 August 2021, by country.

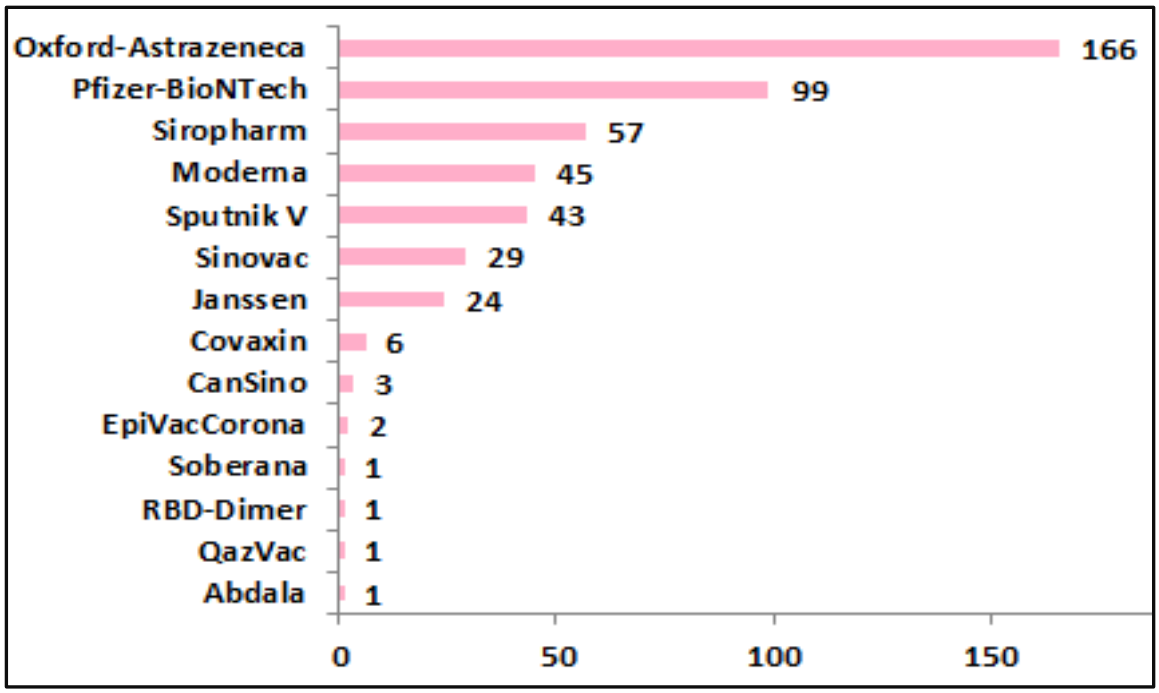

Fig. 6 Number of countries and territories using each vaccine.[29]

Road to recovery:

Combat of corona virus is judgmentally significant cause of few beings, the impact coronavirus can lead to sickness or even bereavement. Getting vaccinated is a unique way of protecting yourself and others from COVID-19.[24] But when disease-causing pathogens enter our body our immunity system gets activated and starts to compete against it. But when the severity enhances our immune system starts to fail, so it is necessary to diagnose and improve our immune system by Immunity boosting herbal plants.

Symptom specific approach in COVID-19:

As mentioned in the below table 5, are the interventions for mild and moderate symptoms mentioned in Siddha guidelines for treating COVID-19 issued by the government of India (AYUSH).[25]

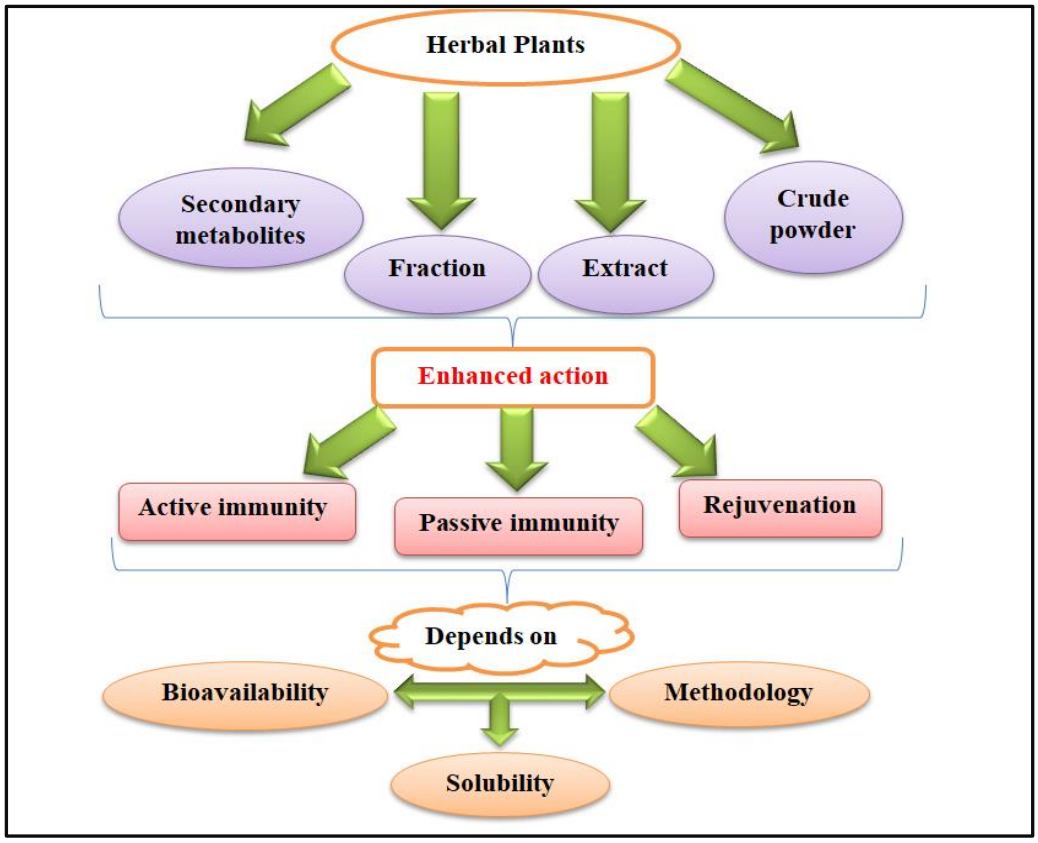

Fig. 7 The enhanced immune response from herbal plants

CONCLUSION:

With the world's second-largest population and an increasingly shoddy epidemic of COVID-19, India looks to be confronting an inadequate healthcare system. Despite vaccination, new mutated strains appeared to be hitting all younger age groups, indicating that a third wave was on the way. The nation's wretchedness is exacerbated by a lack of emergency beds, illegal auctions of O2 chambers and drugs for treating Coronavirus, and timeworn cremations at funerals. Furthermore, the central government's aid was projected to boost vaccine manufacturing.[16] Immunity plays a crucial function in the biological world, and people encounter several challenges in obtaining it. The COVID-19 epidemic is attacking people on this deprived planet, and they are simply attempting to receive a short boost to their immune systems. By initiating active and passive resistant retorts, the unsusceptible arrangement retaliates against disease-causing organisms and onco cells. The immune system's goal is to develop the cytokine response. The most significant immune boosters for fighting infections are garlic, liquorice, and black cumin. The history of Chinese medicine is lengthy and illustrious. and is essential for treating or preventing some common illnesses. For COVID-19, almost 3000 TCM were allocated. Humans with a poor immune response are more susceptible to Covid-19, a worldwide disease. To combat this, tonics made from Astragalus root, angelica root, honey, and ginger progressively enhance immune function, with noticeable benefits in a short period.

Many herbal plants are utilised as immune boosters, such as black soya bean extract for dosage-dependent protection (human adenovirus type 1) and (coxsackievirus B1). Phytochemicals, isolated from crude fractions of flavonoids, terpenes alkaloids, various glycosides, and proteins, play a crucial part in antiviral medicinal plants due to their high therapeutic impact. Rutin inhibits the AVIAN INFLUENZA VIRUS,[62] and HSV-1, HSV-2, and Parainfluenza-3 virus.[60] To circumvent biological defences, we should promote the development of pharmaceutical nanotechnologies in herbal plants with

improved medicinal capabilities. There are 28 Chinese guidelines and two Korean recommendations that the government upholds. For the minor phase of Covid-19, there are 23 herbal formulae, 31 herbal formulas for the reasonable degree, and 21 herbal formulas for the more severe degree. Many health drinks are high in vitamins and zinc, which should be widely promoted in this pandemic age, and these were popular among participants. These studies and conclusions might be used to support health officials' practises. In a nutshell, everything you want is included therein; moreover, all Ayurvedic medications are kept in our kitchen. This review may be used to treat immunological diseases, and the indigenous herbal plant's efficacy can help eradicate the pandemic.

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CONFLICT OF INTEREST:

Authors declare that there is no conflict of interest

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