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Ayurveda Medicinal Herbs and Their Role in Sars-Cov-2 Pandemic's Positive and Progressive Outcome Manifestation

B. Nesamany[1], A. Cheng[2], D. Klokol[3], J.P.L. See[4], M. Chan[5], M. B.F. Wong[6]

[1,2,3,4,5,6]*European Wellness Academy; dr.bawani@ewacademy.eu; drbawaninesamany@gmail.com; angelina.cheng@ewacademy.eu; dr.dmytro@sbi-europe.com; joelsee@ewacademy.eu; mtks3333@gmail.com; wbf6666@gmail.com*

AYURVEDA MEDICINAL HERBS AND THEIR ROLE IN SARS-COV-2 PANDEMIC'S POSITIVE AND PROGRESSIVE OUTCOME MANIFESTATION

Abstract: The massive loss of human lives resulting from the SARS-CoV-2 infection shifted the focus to glaring data that pointed to fatality among humans with poor immunity and comorbidity. In these subjects, the SARS-CoV-2's pathophysiology manifestation was seen to be significantly more alarming than that in subjects who had no comorbidities or major immunity issues. This presented an overdue wake-up call to mankind to actively participate in strengthening immunity, overall wellness maintenance which allows comorbidity management or better, prevention. Food as the major source to serve nutritional needs appears to be a compromised phenomenon. SARS-CoV-2 pandemic presented a harsh reminder that now is the best time to be inclusive of herbs to human lifestyle alongside physical activities and hygiene. This led to an enlarged worldwide interest in traditional medicine. Traditional Indian medicine, Ayurveda, stands as the most ancient yet living tradition, garnered spotlight for being positively and progressively contributing its therapies aiding SARS-CoV-2 pandemic. These further gains weight with more research and a science-based approach. It is inevitable that it still requires more research and evidence-based efforts to fill the prevalent gap. This review was conducted to gain insight into Ayurveda herbal inclusion to SARS-CoV-2 infection management and the outcomes captured. This review aims to encapsulate the efforts documented and explorative data made available. The hope is for this review to make available the option, probability of an inclusive solution that may be considered to co-stand with allopathy in efforts taken to improve human immunity as a prophylaxis measure, at a larger scale. The review led to a hopeful acceptance of Ayurveda medicinal herbs and their role in SARS-CoV-2 management as positive and reassuring.

Keywords: Ayurveda, Covid-19, pandemic, alternative medicine

Introduction

The Pandemic

The pathophysiology of the SARS-CoV-2 has a preliminary basic process that has been described by many. The common recent outcry is that the speed of the virus becomes unrecognizable to the immune cell which is key to determining to manage the virus and its pathogenesis. Certain here again is the uncertainty. The studies various modern sciences and conventional medicine researchers are revolving around is in finding an explanation to immunity's role in the pandemic. Both the alternative medicine and the conventional medicine fraternity agreed that it is the immunity in the infected person that played a major role in the prognosis of the disease.

The Problem

The fact remains that modern medical sciences' drugs; tested-approved-clinical-trialed, to a large extent have side effects that to an acceptable range, is the very pathophysiology of the said diagnosis indicates to manage, or treat. It is acceptable that the words cure and treat are described and sparks a set of responses from the practitioners in the modern medicine and pharmacology industry. The immunosuppressed, immunocompromised, and immune-challenged physiology is another independent, demanding thorough attention, undermined area of study. On the other hand, the tight and broadly reported (evidenced) link to

the inflammation underlying the infected person, i.e. patients with comorbidity is the ones who at large lost their lives in this pandemic. If we were to merge both these vast data and the concerns within the trial line of evidence, the intricate details will point back at many data that is by rule a protocol now, leaving it contestable. However, this is not the analysis' core or periphery aim though there are questions that leave no room for unawareness and are listed as follow:

1. Are we conscious of the crisis and its wrath that we faced during the pandemic?
   - The comorbidity management: are we pooling resources in this area to equate the losses we faced?

2. Different ethnicities have different cultural herbs that could benefit from the rise of processed food and a high technology-dependent younger society.
   - Are we declining the need to be inclusive of the local herbs (that certainly is not voodoo) and perhaps reduce the response that depicts passive-disapproval by actions such as "no comments" or "warning against herbs benefits linked to inflammation or immunity" or "refrain from encouraging researched and endorsed herbs taken as supplements"

3. Do we remember the helplessness of how we had to let go of the comorbidity to stand between our century-long tested medical studies, systems, and efforts, all tossed to the abyss?

4. Are we ready to be better equipped in terms of hygiene, social habits, comorbidity, and immunity?

5. Are we courageous to collaborate and grow partnerships with the world's ancient alternative medicine to co-manage the lessons well learned in pandemics?

6. How data paired by action-ready are we with the health condition of our younger generations such as Gen Z, the Millennials, and Gen Alpha?

7. If we are ready, how inclusive are we to partner with the world's ancient alternative medicine to co-manage?

8. How are we guiding the essence of what the Acharya Dalhana explained *Nibhanda Sangraha* in ancient Ayurveda?

9. If we are managing these younger generations' immunity and delaying or preventing altogether onset of morbidity actively, especially of the metabolic syndrome origin?

10. If we are being inclusive and making enough effort in awareness on their food, habits, lifestyle, technological impact management, and immune-boosting; are we lacking in emphasis on the purposeful inclusion and role of herbs?

11. What about herbs and health endorsement are we afraid of? If a bias is undeniable, what is the value of contrast?

The authorities within the public domain have been providing warning-against or the likes in nature, to not use herbs with a non-specific herb-immuno-stimulation that could worsen the disease progress which in itself is unsubstantiated and lacks in itself clinical backup.

Background

Ayurveda – the pandemic documentation and information

> *(Goswami, 2011) There are sections on longevity, personal hygiene, the causes of illness, the influence of season and time on the human organism, types, and classifications of medicine, the significance of the sense of taste, pregnancy and possible complications during birth, Prakriti, individual constitutions and various aids for establishing a prognosis.*

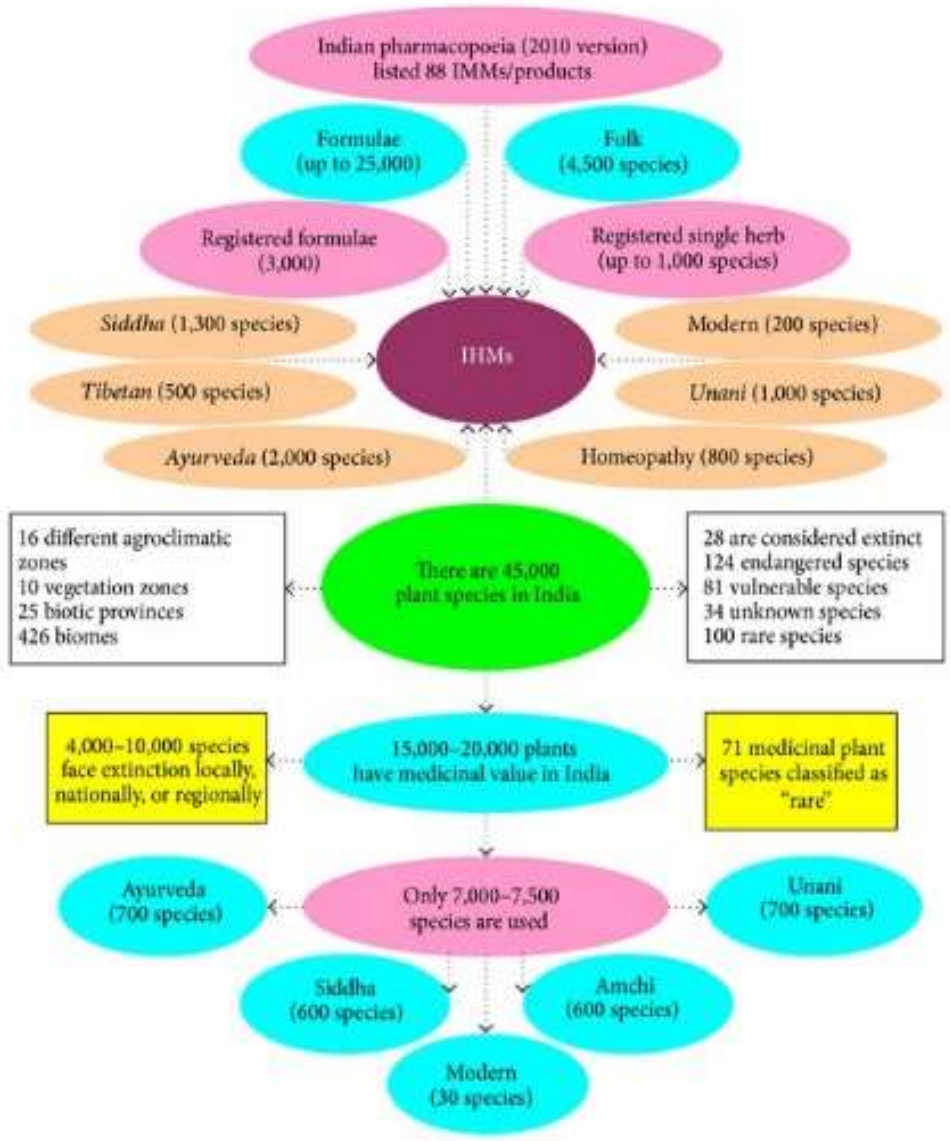
Maharishi Charak (200 BC) is the author of *Charak Samhita*, although Charak is also referred to as not one many writers. *Charak Samhita* is the revised version of *Agnivesa Samhita* which was done under the supervision of the ancient physician Atreya, dating to 6th the century BCE. *Agnivesa Samhita* is said to be the composed encyclopedic medical anthology. The work received little attention. The *Agnivesha Samhitā* was revised by Charaka and renamed the Charaka Samhitā. Maharshi Sushrut (1500 BC) is said to be the Founding Father of Surgery who wrote the Sushruta Samhita, the ancient text on medicine and surgery.

Figure 1: In research from Mukherjee *et al.* (2017); Development of Ayurveda – Tradition to Trend

Ashta means 8, *anga* means branches and *sangraha* means compilation or collection. Thus *Ashtanga Sangraha* means *'compilation of 8 branches of Ayurveda'* and is claimed to be written by *Vagbhata*. In the 2nd half of the seventh century AD, the *Ashtanga Hridaya*, which translates to "*the essence of eight sections"*, is considered one among the finest texts on the subject; was written by Maharishi *Vagbhata*.

Acharya *Vāgbhaṭa* is one (or a group of) the most influential writers, scientists, therapists, and advisors of Ayurveda. Several works are associated with his name as the author, principally the *Ashtāṅgasaṅgraha* and the *Ashtāngahridayasaṃhitā*, 2 great treatises of Ayurveda. There are, however, differences of opinions where the earlier is said to be written by more than one writer and a version that says that the earlier was written by the Senior *Vagbhata (Vriddha)* and the latter was by Junior *Vagbhata (Laghu)*.

Figure 2: in research from Pan *et al.* (2014)



It is indispensable for the modern scientific fraternity to know the Ayurveda's documentation on communicable diseases and their prevention, both by the emphasis on prophylaxis and by immune-boosting, especially if one intends to make strong opposing claims. It is key to understanding that these documentations not only because it has recently gained attention as a post-pandemic effect and it is

thousands of years old but because it would put us in a sincere position to accept, reject, question, and propose further current analyses in the direction of taking calculated risks if we are, as mankind, propagating or ignorantly encouraging the drifting-away-from these guidelines provided which in turn directly exposes us to what we just endured, the global pandemic (not the first time as well).

> The 8 branches are internal medicine, surgery, gynaecology and paediatrics, rejuvenation therapy, aphrodisiac therapy, toxicology, psychiatry or spiritual healing, and ENT (ear, nose, and throat). There is also detailed information on five-actions therapies (Skt. pañcakarma) including therapeutically induced vomiting, the use of laxatives, enemas, complications that might occur during such therapies, and the necessary medications.

Plant-based drugs are divided into 50 groups according to their pharmacologic/therapeutic actions. Although Sushruta Samhita text places special emphasis on surgery, it described 395 medicinal plants, 57 drugs of animal origin, and 64 minerals or metals as therapeutic agents. As it is said, in ancient times, Ayurvedic texts stood very esteemed in countries across the globe. The Ayurveda texts were translated into Tibetan and Chinese (300 CE), Greek (300 BCE), Persian and Arabic (700 CE), and so forth.

In the said Sushruta Samhita (1500 BC), Acharya Dalhana explained *Nibhanda Sangraha* which addresses *Janapadodhwansa* (epidemiological cascades of diseases) concepts. This is the description of the epidemiological cascades of diseases. Information on *Kasa* (cough), *Shwasa* (breathlessness), *Vamathu* (vomiting), *Prathisyaya* (common cold), *Shiroruka* (headache), and *Jwara* (fever) and steps to manage is described as the chapters grew with writers across time. These six are stated to be independent of *Sharira Prakriti* (anatomy) and *Dosha* (physiology) of the individual. Sushrutha Samhita has explained causative factors (etiology), method of the spread, the clinical condition of pandemic epidemiology, prognosis, ways of combating communicable conditions, prevention. The concept of immunity is described under *Vyadhikshamatva* where *Bala* (strength) and *Oja* (plasma) are discussed. The lifestyle-habit protocols and the herbs were described in detail and it is unarguable clear, were focused on balancing the life-health-illness cycle and intently optimizing immunity.

Method

The motivation behind this Narrative Review

The two long years of uncertainty with fear like most have not experienced before impacted every generation, healthy and unwell, obese and fit, rich and poor, urban and rural, developed and third world nations, beyond gender and race. It placed technology and social connection like never before. Businesses evolved and many crashed to seize. Across the world, people were developing economic resilience. People rose to recognize what mattered.

The Aim

This narrative review aims to encapsulate the efforts documented and explorative data made available on the herbs, used as food or drink (not so much as supplements with a sure or treatment protocol) but as a planned and purposefully consumed herbs or herbal mixtures listed in the ancient Ayurveda and as recommended by the Indian Ministry of AYUSH where a large extent of immunity benefits are documented over the past decade.

Discussion

History has it that the 1918 pandemic and its link to crowding, sanitation, immunity, nutrition, and cytokine-storm were all lessons that could have been part of classroom lessons, health awareness efforts, media health compulsory propagation of information, and education agencies' core content for nutrition education and regulatory bodies to work on obesity and co-morbidity, especially among the younger generation. The emphasis given in schools for history on leaders and religion could have a proportionate effort on pandemic history. Unfortunately, the departed would not be able to share how it must have wanted to live, or how it was to pass away alone, away from loved ones, and the feel of drowning. This narrative review is the seed of that unheard voice.

> According to new research, the Centers for Disease Control and Prevention (CDC) in the USA uses COVID-NET in 14 states to monitor the demographics of COVID-19 patients who are being hospitalized. From March 1 through 30, 2020, there were a total of 180 patients on COVID-NET, of which 89.3% of the patients had at least one underlying comorbidity. Of the 180 patients, 94.4% aged 65 years and older had at least comorbidity. The most common comorbidities found were obesity, hypertension, and diabetes mellitus (Sanyaolu et al., 2020).

If many non-senior citizens (younger), with co-morbidity, known and diagnosed with metabolic syndromes lost their battle to SARS-CoV-2, the thought to ponder on the following questions motivated this narrative review:

1. Would timely intervention of the co-morbidity help one to fight SARS-CoV-2 better?
2. Would consistent herbs inclusion in various activities in the deceased life helped the body battle SARS-CoV-2 than without such intervention or nutritional management?
3. Would the pictures, history education with emphasis, and de-myth knowledge of the 1918 pandemic links to hygiene and immunity made the deceased lifestyle a more informed and conscious one?
4. Would lack (currently widely available) of unnatural food paired with broadly made-available non-misleading-caution by scientists' use of herbs help to aid immunity development among the living?
5. Are the clinical trials to support the cautions made?
6. Did the daily sugar and unnatural food intake claimed as scientific fact, make one's immunity building blocks brittle? Is that a key contributor to the deceased co-morbidity that made one's body not withstand and aid the battle with SARS-CoV-2?

7. Aren't all the unnatural food production approved by and made available by the same organizations who are slow in supporting the herbs' use?

The 32 articles were gathered by random selection from an exhaustive list which was a product of key-phrase search in Google Scholar; *Ayurveda herbs in immune development and SARS-CoV-2 management*. The list of Ayurveda herbs and the references made to Ayurveda history, documentation, and Ayurveda Medicine's management protocol alongside the interest to dwell more on the ancient Veda's proofs of positive impact on human immunity outgrew the need to stay within the frame of this review. Such dwelling gave weightage to the Introduction shared above. However, to adhere to the needs, the information presented by the said 32 articles and the referenced article to understand the authenticity of herbs, use in aiding immunity, the SARS-CoV-2 management, and the confirmation of active use rendering documented data affirms the positive and progressive outcome manifestation of Ayurveda medicinal herbs and its role in SARS-CoV-2 pandemic.

It is acknowledged that the consumption of herbal medications, as per the global developed countries' leaning. Innumerable evidence has pointed at herbal preparations or formulations which can be used for the management of numerous diseases, for all ages, with a least of adversarial effects compared to conventional drugs. With the long history of their use, plant-derived herbs and herbal products have acquired popularity in the global market as dietary supplements, registered drugs, cosmetics, health care products, etc. The recognition that medicinal plants are the new therapeutic agents has become inevitable. The consumers' choice is indicative of the supply and demand. This is not only a millennial trend but is sought after for the prevention and treatment of diseases. The public recognition of herbal medicine has surged in Asian countries (70% in China, 49% in Japan, and 80% in India). This is also seen in western countries with the WHO report showing US$61 billion as the worldwide market value of the herbal product. This is projected to grow to US$5 trillion by 2050. This data was before the pandemic. It is predicted that the upcoming data would not be any less with awareness the global pandemic has spotlighted on herbs, especially with the emphasis on their inclusion into the lifestyle and daily routine to manage immunity and overall health. The USA and Europe market segments are 41 and 20%. The use of herbal products by consumers in the USA was less than 5% in 1991 and that increased by ten folds within 15 years. This ten-fold increase had 25% of it made of botanical remedies.

The emergence of SARS-CoV-2 was paired with the absence of official access for Ayurveda physicians and scientists to COVID-19 patients. This makes it difficult for any team of such nature to develop a comprehensive treatment strategy, what more that which is based on Ayurveda principles. In some Indian states and specific sub-localities, Ayurveda Medicinal protocol interventions were administered both for prophylactic measures and there are reports of Ayurveda protocol-based interventions being administered for prophylaxis and care of COVID-19. Data has it that the informal reports of these preventative approaches are promising. It is prevalent that in the *absence* of *proper documentation and research*, one is left with a lack of rigorous data to make significant conclusions. The limitations across the vast majority of the articles reviewed here have similar references to the lack or absence of reports. This is certainly not a limitation if it is viewed in a context that applies to its documentation and acumen.

The desire to have one frame to fit all (i.e. FDA) is in itself an expectation that is non-inclusive at this stage. It is reassuring to note that the alternative path has long taken a partially independent stride. It is noteworthy

to acknowledge here that the *proper documentation and research* that is often referred to as the gap in this area ought to work, hand in hand with the respective science's inclusion and exclusion criteria. It is now, not. It revolves only around a few rigid, global frameworks, which were built around modern medicine both by foundation and pharmacology principles. These do not appear to Ayurveda solutions or management, planning, and decision making. Such *rigid* frameworks and organizations would need sufficient professionals, specialists, and experts who have the breadth and depth of professional experience accompanied by extensive collaborative efforts in their decisions and directions. This is especially as there is a clear need for such intervention. This will give rise to filling the lack of *proper documentation and research* gap. It is time that it shall no longer be the repeating limitation and actively show means on how the limitation is being addressed.

It is also pertinent to state that clinical exposure to COVID-19 patients is essential for Ayurveda physicians to study and understand the disease. The absence of official access to COVID-19 patients makes it difficult for Ayurveda physicians to develop a comprehensive treatment strategy based on Ayurveda principles which is merely the beginning to fill the *proper documentation and research* gap. Systematic data relating to the Ayurveda clinical management of COVID are still in process and not available in a format to be presented in a research journal. It is also undeniable that the epidemic is not new to Ayurveda. Ayurveda's Astanga Madava by Acharya Madava is a recommended read to encapsulate how is and does the Ayurveda lens work. Ayurveda is used as a health care regimen during epidemics in India. It is documented that a patient with Covid-19 was successfully treated by Ayurveda medicine. It is also documented that ten middle-aged patients with co-morbidity and the presence of maximum symptoms of COVID-19 disease were treated with Ayurveda treatment only which showed recoveries, without any complications.

The key herbs that are repeated across the reviewed literature are *Ashwagandha* (Withania somnifera), *Guduchi* (Tinospora cordifolia), *Amalaki* (Phyllanthus Emblica), *Haridra* (Curcuma longa), *Neem* Azadirachta indica), *garlic* (Allium sativum), *tulsi/holy basil* (Ocimum tenuiflorum), *ginger* (ZingiberOfficinalee), *black pepper* (Piper nigrum), *Amalaki* (Phyllanthus Emblica), *Kalonji* (Nigella sativa) and *cinnamon* (Cinnamomum Verum).

It is stated that the Ashwagandha extract possesses selective aptitude to induce type 1 immunity by causing elevation of T helper cells to count, Th1, cytokine interferon (IFN)-gamma and interleukin (IL-2) response while progressively, reducing the level of Th2 cytokine IL-4. Amalaki is stated to be useful as a prophylaxis measure against the Covid-19 pandemic as it is regularly used as an immune-modulator. It improves the immune response by enhancing IL-2, gamma-IFN, and natural killer cell activity. Garlic on the other hand is reported to have, in preclinical trials, antiviral activities against Human Cytomegalovirus (HCMV), Influenza B virus, Herpes simplex virus type 1, Herpes simplex virus type 2, vesicular stomatitis virus, Parainfluenza virus type 3, Vaccinia virus, and human Rhinovirus type 2.

The mixture of Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black pepper), Ginger, and Munakka (Raisin) is released as a protocol by the AYUSH Ministry of India for the Indian population, to be consumed twice a day. Jaggery can be added as optional. Also encouraged is to consume half a teaspoon Tumeric added to warm and is assured to boost immunity. These herbs recommended is reported to have bioactive compounds such as Catechin (C15H14O6), Curcumin (C21H20O6), Camphor (C10H16O), Eugenol (C10H12O2), Methyl chavicol (C10H12O), Cuminaldehyde (C10H12O), Limonene (C10H16), Cuminic

alcohol ($C_{10}H_{14}O$), Gingerols ($C_{17}H_{26}O_4$), Borneol ($C_{10}H_{18}O$), Allicin ($C_6H_{10}OS_2$), Linalool ($C_{10}H_{18}O$), Piperine ($C_{17}H_{19}NO_3$), Resveratrol ($C_{14}H_{12}O_3$), Cinnamaldehyde (C_9H_8O), and Citric acid ($C_6H_8O_7$).

Black Cumin (Nigella Sativa) is a commonly preferred herb in addressing disorders like influenza, bronchitis, asthma, and cough. Thymoquinone is a common phytochemical that has been reported to show promising antiviral effects. The viruses include Hepatitis C and HIV. Black Pepper (Piper Nigrum L.) contains over 600 different phytochemicals such as alkaloids, terpenes, and lignans that have antibacterial, antitumor, antiviral, and anti-inflammatory properties. The key alkaloid compone of black pepper, the piperine, is reported to be effective in respiratory tract infections treatment.

Phytochemicals such as the limonoids and terpene in Neem are arenttimalarial, antibacterial, antifungal, and anti-inflammatory and are effective against almost 200 microorganisms. Neem oil's Azadirachtin is a reported strong insecticide and antimalarial.

The antimicrobial resistance of Ginger against various virvirusesungus, and bacteria is also reported as an effective immune booster. Recommendations to consume 300 μg/mL of fresh ginger isis rere-reported toiinhibitlaque formation induced byHuaa man respiratory syncytial virus (HRSV) by 19.7%. It stimulates mucosal cells to produce IFN-β. IFN-β reduces viral infection.

Guduchi participates in the production of reactive oxygen species in the human neutrophils. Guduchi is also reported to increase IL-1β, IL-6, TNF-α, and granulocyte monocyte-colony stimulating factor (GM-CSF) which are pro-inflammatory cytokines.

Conclusion and Recommendation

The global community is now garnering the momentum to enter the endemic phase at the individual national level. As much as there was uncertainty as the people, front liners and the scientific community was battling the return of yet another virus, which then took the globe to declare a state of emergency and announce, yet another pandemic; the other side of public healthcare witnessed the growth of evidence data. The data had different intent and facts yet the most glaring of all is the co-morbidity and its link to the death rate. This revealed the chronic challenge the human race has been brewing ever since the last pandemic in 1918. It is pertinent that we acknowledge and celebrate all the good that has come from this pandemic. However, it is key to revisit and evaluate the contributing industries' role in shape-shifting human health. We do know that the age group of the population lost in this pandemic has not been extensively subject to that which is shaping the Gen Millennials, Gen Z, and Gen Alpha. The human optimal health parameters, most importantly; the immunity and co-morbidity conditions, are far from absolute clarity. The evidenced-based clinical study framework hurdle that Ayurveda and other alternative medicine will need to cross, is however as stiff and needing evolution, as it can be. Access open to the Ayurveda Medicine community to the international population and technology is far from what it could be to facilitate the post-pandemic concern, the overall health promotion, co-morbidity control and management, and nutrition balance. The Ancient Ayurveda presented the Veda (earliest bodies of scriptures) which dwelled in times without the *modernization* of the current clinical trials, its frameworks, and its pre-stipulated analytical outcomes. The documented role of herbs observed in the pandemic's positive and progressive outcome manifestation is a

good call to actively endorse the coming together of the conventional medical fraternity and the Ayurveda medical and sciences fraternity to purposefully, join hands with measurable and planned intended outcomes, at an international scale.

Limitations

The body of research and data reviewed herein is a product of random selection. However, the unanimity of the positive and progressive contribution of herbs to the population during the pandemic management and the need for more research, clinical trials, and predominantly Indian-origin authors and publications is a clear sign that international reciprocation is overdue.

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APPENDIX

DATA of randomly selected 32 Articles which were reviewed to present this narrative | (**RA#:** Research Article Number – a randomly assigned tag to process sort data)

KEY: Yellow: Ayurveda treatment plan and protocol Blue: Herbs Names

RA#01

According to World Health Organization (WHO), approximately 80% of the world population opts for traditional herbal medicines for their essential health care regimen particularly in South Asia and Europe. In this review article, five (5) important herbs and spices are discussed together with their main bioactive compounds in relation to its role in the immune system.

Giloy (Scientific name: Tinospora cordifolia), Ashawagandha (Scientific name: Withania somnifera), Garlic (Scientific name: Allium sativum), (iv) Turmeric (Scientific name: Curcuma longa), (v) Ginger (Scientific name: Zingiber officinale)

RA#02

In the light of Covid-19 outbreak, a vast number of the world population is greatly afflicted by its impact on the economic as well as its toll on psychological effects. The correlation between the psychological distress and the immune susceptibility towards Covid-19 infection is discussed in terms of psychoneuroimmunology and the meaning response. Psychoneuroimmunology: It was assumed that the cellular mechanism in vitro could modulate psychoneuroimmune pathways while others mentioned the effect can only be refer from the evidence of alleviating psychological distress and protection against specific diseases. "Meaning response"; however, there is no direct evidence which concluded that "meaning response" is able to affect the immune response. It is assumed that the alternations in the immune-inflammatory response in vivo together with reduced psychological distress via the effects on mesolimbic and mesocortical brain circuits which bring about the response.

RA#03

The Ayurveda system of medicine described prevention as its primary mode of action during a disease outbreak. The fundamental knowledge of Ayurveda encapsulated the concept of ojas which support and protect life from the detrimental effects of various diseases. Ojas is described as an essence of seven dhatus and an important site of prana. It is responsible in promoting cellular growth and preventing cellular destruction.

In terms of immune system, multiple types of ojas is presented with correlation to its physiological functions in the body:
(i) Dhatu tejo rupa ojas is present in all the tissues of the body which indicated its involvement in the immune response at the tissue level. Examples: tissue macrophages, mast cells, and other white blood cells of tissue pool.
(ii) Rasatmaka ojas is found circulates all over the body through the cardiovascular system along with rasadhatu. Examples: all the white blood cells and other substances related to the immune system like those of the complement system and antibodies circulating in the intravascular compartment.
(iii) Shukramala rupa ojas has a primary function in protecting the fetus during the intrauterine life and the example of such ojas is the immunoglobulin which cross the placental barrier to enter the fetal circulation.
(iv) Jivasonita rupa ojas is specifically refer to all blood cells in the body. The hypersensitivity reactions involving blood cells can be mutually explained from the malfunctioning of this type of ojas.

RA#04

The demand of a reliable and safer medicine against Covid-19 is still in its process of reaching such criteria. Hence, the action of strengthening the immune system is now widely sought. It is reported that Rasayana drugs are able to cause damage on the Covid-19 structure by binding to the spike protein, E protein and N protein. Its nature to bind specifically to the Nsp1, Nsp 3c, and ORF7 protein resulted in the inhibition of its virulence.

The examples of potential Rasayana drugs with its mechanism of action are listed as below:

Tulsi, Dalchini, Sunthi, Maricha, Guduchi, Ashwagandha, Haridra and Makardwaja.

RA#05

Pandemic is defines as an outbreak that spread to multiple countries or continents. As described in Ayurvedic medicines, the Rasayan dravyas are notably known for their immunomodulatory and rejuvenating properties.

The list of Rasayana (Immunomodulatory drugs) is as follows:
(i) Ashwagandha (Scientific name: Withania somnifera), (ii) Guduchi (Scientific name: Tinospora cordifolia), (iii) Amalaki (Scientific name: Phylanthus embelica), (iv) Haridra (Scientific name: Curcuma longa) and (v) Agastya Haritaki

RA#06

In Sanskrit, Ojas is defines as "vigor" or "essence of vitality" of the Kaphadosha and the formation of Ojas is similar to the production of ghee from milk. Hence, Ojas is the final product of all natural transformation and is consider to be precious. An individual with great amount of Ojas rarely becomes ill. The Sutrasthana has described the Ojas core is described as the heart where it is known to circulate to the entire body. The best method of enhancing Ojas is by consuming pure whole milk. For non-vegetarians, ghee is highly recommended. These mentioned foods should be close-grained with the drugs of Jivaneeyagana. Besides that, the use of pleasant fragrance is suitable for the heart (Hridya) which ultimately, helps to increase the Ojas.

The above is interpreted as the presence or state of constant effort to manage stress, be in pleasant and hygienic state where the vitality and the mood of one will not cause intrinsic hormonal or biochemical disturbances that once again, exposes or keeps the body in a state to acquire diseases and manifest the pathophysiology.

RA#07

The Covid-19 pandemic first started in Wuhan (China) in the late 2019 which has spread Worldwide causing serious implications. Most of those infected with Covid-19 virus will experience a multitude of symptoms ranging from minimum towards a more detrimental health condition especially individuals with immunocompromised as their immune system's defenses are the lowest. As of today, there is no evidence-based specific therapy for Covid-19 infection and the safety of this therapy is questionable. Therefore, the urge to seek for a safer and efficient medicines has pave the way for traditional herbs particularly Ayurvedic medicine.

Allium sativum, Althaea officinalis, Andrographis paniculata, Commiphora molmol, Cymbopogon citratus, Echinacea sp. (E. purpurea , E. angustifolia), Eucalyptus globulus, Foeniculum vulgare, Glycyrrhiza glabra, Hedera helix, Justicia pectoralis, Magnolia officinalis, Malva sylvestris, Mikania , Ocimum gratisssimum, Pelargonium sidoides, Pimpinella anisum, Plantago lanceolate, Platycodon chinensis, Polygala senega, Polypodium vulgare, Potentilla erecta, Primula veris, Salix alba, Sambucus nigra, Scutellaria baicalensis, Silybum marianum, Thymus vulgaris, Zingiber officinale.

RA#08

A systematic decentralized method of organization is essential to ensure greater implementation of the Ayurvedic preventive and curative strategies during this Covid-19 outbreak. This novel approach is first attempted in Kerala. In record, the Amritham program has reached to 25.7% of the quarantined individuals located in Kerala from 21st May 2020 to 8th July 2020. It is worth mentioning that only 0.34% of these individuals are tested positive for SARS-CoV-2 infection. The outcome of this implemented system has proven the efficiency of decentralized organization with the support of the general public is capable to manage early crises.

Government of India (GOI) approved the use of Ayurvedic regimen in boosting the immunity of the population against COVID-19 in the initial stage of the pandemic itself.

RA#09

The Indian AYUSH ministry has highlighted three (3) major prophylaxis measures during the Covid-19 pandemic. The first measure is to drink warm water throughout the day followed by a daily practice of Yogasana, Pranayama and meditate for at least 30 minutes per day. The third major measure is to included spices in our daily cooking such as Haldi (Turmeric), Jeera (Cumin), Dhaniya (Coriander) and Lahsun (Garlic). Besides the practical measures, the ministry has also suggested traditional herbal methods to boost the immune system. It is highly recommended for the public to consume herbal decoction (Kadha) made from herbs and spices such as Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black pepper), Ginger and Munakka (Raisin) for once or twice a day with added Jaggery (natural sugar) to make it more favorable if needed. In addition, they encourage to consume milk with half tea spoon of Haldi (turmeric) powder once or twice in a day for immune-booster effect. The above medicinal herbs and spices contains various bioactive compounds namely Curcumin (C21H20O6), Cuminaldehyde (C10H12O), Cuminic alcohol (C10H14O), Limonene (C10H16), Borneol (C10H18O), Camphor (C10H16O), Allicin (C6H10OS2), Methyl chavicol (C10H12O), Eugenol (C10H12O2), Linalool (C10H18O), Piperine (C17H19NO3), Gingerols (C17H26O4), Resveratrol (C14H12O3), Cinnamaldehyde (C9H8O), Catechin (C15H14O6) and Citric acid ($C_6H_8O_7$).

RA#10

Eliminated as the article was predominantly presenting on licorice from a traditional Chinese medicine data.

RA#11

The practical lifestyle of Ayurveda must be incorporated in daily routine as an alternative regime to boost immunity. The Ministry of AYUSH, Government of India has published its approved guidelines.
To enhance the immune system, it is advisable to follow the guidelines prepared by the Ministry of AYUSH which stated that Chyavanprash in 10gm (1tsf) should be taken in the morning. However for diabetic patients, they should opt for sugar free Chyavanprash. In addition, the public should consume herbal tea/decoction (Kadha) which consist a mizture of Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black Pepper), Shunthi (Dry Ginger) and Munakka (Raisin) at least once or twice a day with added flavor such jiggery (Natural Sugar) and/or fresh Lemon Juice if required. The ingredients of Golden Milk consist of half tea spoon of Haldi (Turmeric) powder in 150 ml and must be consumed once or twice a day.

RA#12

In Ayurveda, the word 'epidemic' is define as 'Janpadoddhavansa' which means a large population of individuals are affected by the same disease at the same time irrespective of their bala (strength), food habits, behavior and psychological. To remain healthy in spite of the Covid-19 outbreak, 'Swasthvritta' measures are incorporated in our daily lives. The 'Swasthvritta' measures included a list of healthy daily regimen, seasonal regimen, exercise, food and behavior habit, yoga, pranayama, yoga purification method and good morals which all interrelated with one and another. This review article also described Pippali (scientific name: Piper longum) as one of the Rasayana herb which can be used as chaushshta pippali yoga (64 pippali course) to provide overall strength to the respiratory system.

RA#13

The Ayush Kwath consist of a mixture of four (4) medicinal herbs namely:
(i) Ocimum sanctum Linn. (Hindi: Tulsi, English: Holy Basil)
(ii) Cinnamomum zeylanicum Breyn. (Hindi: Dalchini, English: Cinnamon)
(iii) Zingiber officinale Rosc. (Hindi: Sunthi, English: Ginger)
(iv) Piper nigrum Linn. (Hindi: Marich, English: Black Pepper)
The Ayush Kwath has been demonstrated of having psycho-neuro-immune mechanisms via the reduction in depression, anxiety, and stress in controlled trials which could be a plausible remedy for Covid-19 infection.

(i) Tulsi (Hindi: Tulsi, English: Holy Basil), (ii) Dalchini (Hindi: Dalchini, English: Cinnamon), (iii) Sunthi (Hindi: Sunthi, English: Ginger), (iv) Marich (Hindi: Marich, English: Black Pepper)

RA#14

The proposed Ayurveda interventions during Covid-19 as follows:
(i) Unexposed asymptomatic group: This particular group of individuals does not have any related symptom nor have any associated risk factor and comorbidities. The proposed intervention based on Ayurveda system of medicine included healthy diet, healthy life-style, adequate sleep, physical activity, good conduct, care for retainable and non-retainable urges, and avoidance of disease causing factors (excessive cold and exposure to pollutants). It is also advisable to fumigate homes by Ayurvedic herbs such as garlic (Allium sativum) peel, turmeric (Curcuma longa) powder, Carom or Ajwain (Trachyspermum ammi) seeds and Loban (resin of Styrax benzoin and Boswellia species) for disinfection purpose.

(ii) Exposed asymptomatic (quarantined): This group consist of people who are in contact from positive case of Covid-19 however, they doesn't have any apparent symptoms. A more prophylaxis measure is taken which included Sanjeevani vati and Chitrakadi vati and in combination of Guduchi (Tinospora cordifolia), Shunthi (Zingiber officinale) and Haridra (C. longa). The aim of this measure is to ensure the maintenance of agni and aam pachana to prevent the progression of its pathogenesis. It is also advisable to provide a decoction in a combination of Ayurvedic herbs which include T. cordifolia, Z. officinale, C. longa, Ocimum sanctum, Glycyrrhiza glabra, Adhatoda vasica, Andrographis paniculata, Swertia chirata, Moringa oleifera, Triphala and Trikatu. These herbs are highly recommended for this group as they are proven having anti-viral property.

(iii) With mild Covid-19 symptoms: Individuals belong to this group are found to be positive to SARS-CoV-2 and are having mild URTI symptoms. Formulations like Lakshmi Vilas Rasa, Pippali rasayana Sanjeevani vati , C. vati, Go jihvaadi Kashaya, Vyaghri haritaki, Kantakaari Avaleha, Dashamul kwath, Sitopaladi , Talishadi, and Yashtimadhu may be recommended for this group.
(iv) With moderate to severe Covid-19 symptoms : The individuals with moderate to severe symptoms are categorized in this group. The recommended Ayurvedic herbs formulations here may include P. rasayana , Laghu Vasant Malati, Sanjeevani vati, Tribhuvan keerti rasa, Brihata Vata Chintamni rasa, Mrityunjaya rasa, and Siddha makardhvaja rasa.

RA#15

The Ministry of AYUSH has recommended the use of the Kadha Herbal Tea which is made up of holy basil (Tulsi), cinnamon (Dalchini), black pepper (Kalimirch), dry ginger (Shunthi), and raisin (Munakka) for self-care which can aid in developing and strengthening the immune system against severe infections caused by Covid-19. Another drink which was recommended by the Ministry is the Golden Milk which comprises of hot milk (150 ml) and half a teaspoon on Turmeric powder that can be take once or twice daily. Immunity boosting primarily involves the modulation of multiple proteins which are involved in homeostatic regulation. Covid-19 patients suffer from compromised immune response and thus the combined action of Herbal Tea and Golden Milk not only boosts immunity but can also modulate pathways which are involved in the pathogenesis of multiple diseases such as diabetes and hypertension.

Based on the enrichment analysis of modulated proteins, it has identified the regulation of HIF-1, p53, PI3K-AKT, MAPK, cAMP, Ras, Wnt, NF-kB, IL-17, TNF, and cGMP-PKG signaling pathways which are directly involved in enhancing the immune system. HIF-1 α has also been reported to dysregulate viral infections and boost the body's immune system through the regulation of the tasks of macrophages, neutrophils, dendritic cells and lymphocytes during the hypoxic condition which usually happens in Covid-19 infections as a result of the improper exchanges of oxygen and carbon dioxide in the lungs.

The use of Kadha Herbal Tea could regulate PI3K-AKT, NK-kβ, interleukin and TNF mediated cytokine regulation. Furthermore, it is predicted that the phytoconstituents of the 6 medicinal plants were involved in modulation of Ras signaling pathway which suggested the health benefits of the Herbal Tea in regulation of cell survival and proliferation.

Therefore, the integrative use of Herbal Tea and Golden Milk is highly recommended by the Ministry of AYUSH as it not only enhances the immune system but is also directly involved in the regulation of multiple pathways of disease development thereby providing a holistic benefits to individuals with comorbidities.

RA#16

Ayurveda has several potential drug candidates that can be used as an add-on therapy with the empirical modern medicine therapy in the management of COVID-19. This is an opportune time to take this bold step and explore the tremendous potential that these ayurvedic drugs could potentially offer. This integrative approach can be initiated in several hospitals across the country in a standardized manner under the supervision of a modern medicine experts and Ayurveda experts. This will also help generate the scientific evidence for such an approach. There are already more than 50 ongoing studies in India. The Ministry of AYUSH and Council for Scientific and Industrial Research with support from Indian Council of Medical Research has initiated clinical trials for prophylaxis and adjunct treatment with Ayurveda formulations.

Convalescence and rehabilitation:

There is emerging evidence that SARC-CoV-2 has the potential to leave behind a significant amount of pulmonary fibrosis. The patients who recover from COVID-19 disease with some sequelae will need pulmonary rehabilitation with the focus on symptom relief, improving pulmonary function, improving quality of life and reducing stress. Ayurveda and Yoga have a lot to offer in this space through its various exercises and meditation programs. The effects of pandemic will be beyond the number of cases. The economical, psychological, and social effects of disease will be beyond measurement. This is the time we should be practicing Yoga with its true meaning and broader approach. We need to adopt Yoga for community based interventions but following rules of social distancing. This needs innovation in research, education and delivery of Yoga interventions.

RA#17

The present study consist of a total of 10 mid aged patients who had some form of Flue Like Ilness (FLI) or Severe Acute Respiratory Illness (SARI) and 6 patients of them are having diabetes whereas 2 were with hypertension and diabetes while the rest are without any morbidities.

Proprietary formulation medicines are utilized which involves:

(i) Tamra Sinduradi Yoga 250 mg - which should be taken twice daily every 12 hours. It is a classical medicine for acute respiratory illness (i.e. Tivra kasa and Darun Shwasa). This classical medicine comprises of Tamra Bhasma (30 mg) and Rasa Sindura (30 mg). Tamra Bhasma is known to work against the SARS-CoV-2 virus as the copper nano particles or copper surface has strong antiviral properties.

(ii) Bhunimbadi Kwath 10-20 mL - which should be taken thrice daily. The Kwath contains herbs such as Bhunimba, Katuki, Guduchi, Musta and Shunthi which are required to break down the pathophysiology of the Covid-19 pandemic.

(iii) Nefpro Liquid and capsule – a polyherbal formula which should be taken thrice in 10 mL doses. Its indications are CKD.

(iv) Carmiliv capsule – a polyherbal formula which should be taken once in 1 bid. Its indications are infective liver disorders.

(v) Ashwagandha capsule – 2 to be taken at night.

*All the Ayurvedic Medicines are licensed Ayurvedic medicines and are produced by Progen Research Lab which is a GMP certified Ayurvedic Pharmaceuticals. (The other medications like anti diabetics and anti-hypertensive which were ongoing were allowed to continue as is). With the Ayurveda medicine intervention, all of the patients showed significant decrease in C Reactive Protein (CRP) along with reduction in almost all symptoms. From this outcome, it can be hypothesized that Ayurveda medicine has a pivotal role in regulating the cytokine storm as it happens. The reduction of CRP is postulated due to the Tamra Bhasma role as a chelating agent for Free Fe (Haem) ions. It is able to catch free radicals like free-flowing Haem ions which leads to reduced inflammation.

RA#18

The prevention and management of infectious diseases can be done using Ayurvedic medicine.

Several methods of prevention are proposed in this study which include:

(i) Monitoring changes in weather and environment with geo-ecological and climatology advanced technologies to predict and prevent the spread of infections by planning and making sufficient arrangements before the start of epidemics.

(ii) The enhancement of immunity and subsequent prevention of communicable diseases are based on the concepts of "Dinacharya" (~daily regimes) and "Ritucharya" (~seasonal regimes).

(iii) Ayurvedic practices such as Panchakarma (~bio-purification) and Rasayana (~immunomodulators) can be implemented in high risk-prone areas to ensure the safety of the population living in that area who may be having compromised immunity.

The Ministry of AYUSH, Government of India has issued an Ayurvedic immunity-boosting advisory for self-care during the COVID- 19 crisis. Ayurvedic immunity promoting medicine like Chyavanprash, turmeric powder with milk, herbal tea/decoction (Kadha/Kwath) made from Holy Basil (Tulsi), Cinnamon, black pepper, dry ginger and procedures like Gandusha (oil pulling), as well as the application of Sneha (cow's ghee) within nostrils and daily practice of Yogasana, Pranayama, and meditation have also been advised.

RA#19

Ayurvedic herbs are utilized as a way of alternative and safer approach to boost immunity against Covid-19 infection. In this review, 12 medicinal plants with its major phytoconstituents are discussed in association to its immune-booster properties.

There have been numerous studies conducted on the antiviral properties of Ayurvedic herbs which could be useful in the prevention of Covid-19 infections and symptomatic management. Active compounds of essential oils containing linalool have anti-influenza effects whilst Triterpene Glycosides Saikosaponins (A, B2, C and D) which are isolated from medicinal plants are effective against coronaviruses. These natural compounds act to prevent the early stages of HCoV-22E9 infection which include viral attachment and subsequent penetration. Natural inhibitors such as nsP13 helicase and 3CL protease which are effective against SARS-CoV enzymes have been found on myricetin, scutellarein and phenolic phytochemicals.

Tinospora, Licorice, Chirata, Basil, Ginger, Turmeric, Garlic, Ashwagandha, Moringa, Nepalese Pepper, Cinnamon, Indian Gooseberry.

RA#20

Medicinal plants hold promising phytochemicals that can be used in the development of treatments against SARS-Cov-2 infections.

Black Pepper (Piper Nigrum L.), Holy Basil/Tulsi (Ocimum Sanctum), Black Cumin (Nigella Sativa), Astragalus (Astragalus Membranaceus), Quinine (Cinchona Officinalis), Elderberry (Sambucus Nigra), Giloy (Tinospora Cordifolia), Neem (Azadirachta Indica), Clove (Syzgium Aromaticum), Ginseng (Panax Quinquefolius), Licorice (Glycyrrhiza Glabra), Kalmegh (Andrographis Paniculatais), Garlic (Allium Sativum), Ginger (Zingiber Officinalis), Betel Vine (Piper Betel), Turmeric (Curcuma Domestica), Ashwagandha (Withania Somnifera).

RA#21

Ayurveda has used various immunomodulatory herbs to treat various viral diseases over the centuries. Adhatoda vasica is renowned for its efficacy in treating respiratory disorders such as bronchitis.

Asparagus Racemosus (Shatavari), Boerhavia Diffusa L. (Punarnava), Curcuma Longa L. (Haridra), Embelia Ribes (Vidang), Glycyrrhiza Glabra L (Yastimadhu), Phyllanthus Emblica L. (Emblica Officinalis), Phyllanthus Amarus (Bhumi Amalaki), Piper Longum (Pippali),
Stereospermum Suaveolens (Patla), Terminalia Chebula (Haritaki), Tinospora Cordifolia (Guduchi), Withania Somnifera (Ashwagandha)

RA#22

1. Echinacea Purpurea (Purple Coneflower) contains bioactive compounds like chicoric acid, alkylamides and polysaccharides has been traditionally used by Native Americans to treat respiratory infections. Echinacea has an anti-inflammatory effect that inhibits the production of proinflammatory cytokines caused by the Covid-19 virus such as IL-6, IL-8 and TNF-α.

2. Curcumin (Turmeric) is an antioxidant and anti-inflammatory agent.

3. Cinchona is rich in quinine sulphate and is popular as an antimalarial drug. A clinical trial proved that hydroxychloroquine improved SARS-CoV-2 viral load when combined with azithromycin in covid-19 patients.

4. Xanthorrhizol has antimicrobial, anti-inflammatory and antioxidant properties. It can be used as an immunosuppressant for Covid-19 because of its ability to inhibit pro-inflammatory cytokines.

RA#23

The probable role of Withania somnifera is described upon three levels of severity of Covid-19:

(i) Mild

In Ayurveda, the plant Withania somnifera is utilized in order to manage primary nonspecific symptoms of Covid-19 infections. The fever is mediated by COX-2 enzyme and prostaglandin molecules. The antipyretic effect of WS is evident through COX-2 inhibition and prostaglandin suppression.

(ii) Moderate

The plant is well documented for its anti-inflammatory action in several inflammatory diseases. It may act as a drug of choice in such cases to normalize inflammatory signals and restore the normal functioning of immune cells in disease conditions. However, more studies need to be done in order to verify this.

(iii) Severe

It was reported that Withania somnifera has anti-inflammatory and organ-protective effects which may be useful in reducing the severity of inflammation-induced organ damage for severe cases of Covid-19 caused by the cytokine storm.

RA#24

Food is the major source for serving the nutritional needs, but with growing modernization some traditional methods are being given up (Table 1). Hence, the modern food habits are affecting the balanced nutrition [2]. There is an ever widening gap in nutrient intake due to which normal life is no longer normal. However, affluence of working population with changing lifestyles and reducing affordability of sick care, in terms of time and money involved, are some of the forces that are presently driving people towards thinking about their wellness. **(a pre-pandemic, 2013, published statement)**

More than 80 percent of people in developing countries cannot afford the most basic medical procedures, drugs, and vaccines. Among wealthier populations in both developed and developing countries, complementary and alternative practices are popular although proof of their safety and effectiveness is modest. Evidence-based research in Ayurveda is receiving larger acceptance in India and abroad. The National Center for Complementary and Alternative Medicine has been inaugurated as the United States Federal Government's lead agency for scientific research in this arena of medicine.

Shatavari, Guggul, Nagarmusta, Garcinia, Yashtimadu (Licorice), Gurmarar, Nimba (Neem), Karela (Bitter Melon), Shigru (Horseradish tree), Kiwanch, Jatamansi, Pippali, Maricha (Black Pepper), Pasanavedha (Indian Long Pepper), Haritaki, Guduchi, Ashwagandha and Sunthi.

RA#25

Traditional Chinese medicine (TCM) is included as one of the treatment options of COVID-19 guideline endorsed by the National Health Commission of the People's Republic of China since the third version to the current eighth version. TCM, as documented in the Chinese National Health Commission guideline, has been used in previous viral diseases including SARS and H1N1 influenza which shown beneficial therapeutics and preventive potentials. Small number of COVID-19 patients have improved clinically when treated with TCM in combination with Western medicines including the usual anti-viral and supportive care.

Liquorice has been known for its viral replication inhibition for various viruses including Hepatitis B, Hepatitis C, Influenza, H1N1 and HIV. To make findings more interesting, ethanol extract of polysaccharides derived from Glycyrrhiza glabra were proved able to stimulate immune system via increment of serum IgA, IgG and IgM levels along with an increase in proliferation of spleen lymphocytes.

Caution data also exists: It is recommended to avoid excessive intake of liquorice for people aged 40 years and above, people who has history of heart disease or anyone who are more prone to cardiac arrhythmias. Patients taking ACE inhibitors antihypertensive, loop diuretics or thiazides diuretics, should minimize or abstain consuming liquorice due to additive potassium lowering effects from these medications and liquorice, which may lead to hypokalaemia. Patients taking warfarin or digoxin should avoid liquorice products completely to avoid toxicity. The use of liquorice in pregnancy and neonates should be cautioned.

RA#26

A total of 250 people were involved in this questionnaire-based survey at North India and from the survey, a total of 66.8% of the participants confirmed using traditional herbs and spices. Hence, traditional home remedies play a major role in North India as the first line of action in prevention of Covid-19.

Traditional home remedies are widely used in low to middle income countries where approximately 70-80% of the population are dependent on herbal based medication as their primary healthcare. Close to 25,000 plant-based formulations and extracts are used in native folk medication across the south Asian continent due to easy accessibility to the ingredients and as a result of the lack of access to formal healthcare services.

Most frequently used home remedies were decoction of herbs including ginger, Tinospora cordifolia, turmeric, black pepper, carom seeds. Turmeric milk was also popular choice. COVID positivity was present in family members of 4% (n = 10) of the respondents, of these four did not consume any herbs. Conclusions: This study provides an overview on the use of home remedies in North India. Given the scarcity of reliable information on home remedies and traditional medicines, further research is needed to develop robust evidence for their role in disease prevention and treatment.

RA#27 (non-peer reviewed)

The macro and micro nutrients deficiencies are threatening because it causes the body to be infected easily by pathogens. The balanced diet along with the supportive therapies can help a patient to recover from infections and diseases like COVID-19. An immunomodulatory effect is one that defines intensification or diminution of immune responses and the agent that brings it about is referred to as an immunomodulator.

Shatavari, Mexican oregano, ginseng, sage, ashwagandha, ginger, cumin, fenugreek, capsaicin, turmeric.

RA#28

Comparative analysis of Ayurveda and allopathic treatment strategies were carried out in the present study.

Ayurvedic medicine is useful as a preventive measure against Covid-19 infection. Formulation prescribed are listed in Table 1 according to the groups of infected individuals ranging from exposed asymptomatic group to those with maximum symptoms. Allopathic treatment involved intravenous infusion of fluid, oxygen therapy and life support system in critical cases, antivirals and steroids.

Table 1 Four specific classifications of Ayurveda medication during the pandemic period of COVID-19

Groups	Characters	Herbs
No symptoms and also unexposed	Do not assimilate those people who do not have related side effects neither they have hazard issues. They doubtless they are most likely invulnerable from disease because of parthenogenesis [48]	For purification of the body herbs like *Allium sativum* strip, *Curcuma longa* powder, *Trachyspermum ammi* seeds, and Loban were used whereas for respiratory tract *Swarna Prashana*, and mass prophylaxis of *rasayana*, *Brahma Rasayana*, Chyavanprasha or Amrit Bhallataka, Rasayana + Samhita were used
Mild symptoms	Have very less symptoms like fever, tiredness, cough, etc. and no need to be hospitalized. Home quarantine and to maintain social distance with family members too.	Nardiya, Ginger Root, *Gojihvaadi Kashaya*, *Pippali rasayana*, *Sanjeevani vati*, *C. vati*, *Solanum surattense*, *Dashamul kwath*, *Talishadi Sitopaladi*, and *Yashtimadhu*
Medium symptoms	Moderate to maximum symptoms. Took place with high hazard gathering. Severe symptoms like difficulty in breathing, pain in chest, and deafness; also, they can lose movement too. The patient took into consideration from initial stage and co-recommended with Ayurveda drugs.	*P. rasayana*, *Laghu Vasant Glycyrrhiza glabra*, *Semecarpus anacardium*, *Tribhuvan keerti rasa Brihata Vata Chintamni rasa*, *Mrityunjaya rasa*, and *Siddha makardhwaja rasa*
Quarantined	People who did not have any clear signs but still they are in danger because of contact history with patients. Tested on the basis of their contact history.	Sanjeevani vati, Chitrakadi vati, Guduchi (*Tinospora cordifolia*), Shunthi (*Zingiber officinale*), Haridra (*C. longa*), Sanjivani vati, *T. cordifolia*, *Z. officinale*, *C. longa*, *Ocimum sanctum*, *Glycyrrhiza glabra*, *Adhatoda vasica*, *Andrographis paniculata*, *Swertia chirata*, *Moringa oleifera*, Triphala

RA#29

According to Ayurveda, the knowledge of preventive care is derived from the concepts of 'Dinacharya' (daily regimes) and 'Ritucharya' (seasonal systems) for optimum health. This refers to the seasonal changes resulted in one or different disorders if the body is not synchronized with the external environment such as the weather.

Through Ayurvedic medicines, multiple symptoms associated with COVID-19 like high fever, severe cough, and body pain can be cured, and further progression of these symptoms can be stopped. In comparison to allopathic treatment, Ayurveda's approach is more holistic in nature by nurturing physical, intellectual, emotional, vocational, financial, social, spiritual, and environmental factors. National Institute of Medical Science, Jaipur invented the Corona Virus medicineCoronil (a combination of Giloy, Tulsi, and Aswagandha).

RA#30

According to Ayurveda, the state of health is described as a balance consisting of Doshas (Vata, Pitta, and Kapha) Dhatu and Mala. The imbalance of one or more of these may lead to the development of pathogenic diseases such as in the case of SARS-CoV-2 in Pranavaha srotas (respiratory tract), further leading to vitiation of Sharirik Doshas, which not only produces pathological changes in the respiratory system but also spread in the whole body to produce Sarvadhik lakshan (systemic manifestations).

The IBKS has been formulated by the National Institute of Ayurveda, an apex Institute under the Ministry of AYUSH. The formulation for IBKS (Immune booster Kashay) is listed as below. The herbs used in IBKS are reported having antiviral, immunomodulatory, antioxidant, antipyretic, anti-inflammatory, cardioprotective, antianxiety, and phagocytic properties which can be useful as a prophylaxis measure against Covid-19 infections.

RA#31

In the present state of emergency across the global time tested knowledge of Ayurveda may come to rescue in both preventing and managing the cases of the COVID-19. There is analogy between Rajayakshma and COVID-19. The management strategy of Rajayakshma which also follow the management strategy of Janpadodhvansa is useful in COVID-19. This management strategy might be helpful in managing the pandemic with the least resources and most economical way in large populations.

RA#32

There is lot of similarity in COVID-19 and Rajayakshma disease. Rajayakshma disease is Tridoshaja and the epidemiology and pathogenesis of COVID-19 suggests it as Tridoshaja. In Rajayakshma, spread is as contagious disease (kustha), with Agantu Anubandhtvat (the causative factor is acquired from outside not resultant of the body's metabolisms) and Naanurakshataha (by getting exposed to the causative) this is also true for COVID-19. Ayurveda pandemic are mentioned as Janpadodhvansha or Maraka.

In these Pandemic one or more conditions like Kasa (cough), Shwasa (dyspnea), Vamathu (vomiting), Pratisyaya (Rhinorrhoea), Shiroruja (headache) and Jwara (fever) may be present. In COVID-19 disease nearly all these symptoms are commonly found. Rajayakshma is considered as Roga Samuhanam (a condition with many disease or symptoms).

As various new symptoms are also appearing in COVID-19 hence it can also be considered as Roga Samuhanam. Asymptomatic and mild symptomatic cases are more prevalent in COVID-19. Reason for this is also described in Rajayakshma as presence of optimum Bala, Mamsa and Rakta (strength, weight, blood etc.). If patients have all symptoms of disease even then it should be considered as suffering from less symptoms (asymptomatic and mild symptomatic). This is responsible for the fast recovery in these types of patients. In some cases death resulted in COVID-19 from hypoxia due to cytokine storm in body and the same situation is in Asadhyavastha (incurable condition) and death in Rajayakshma due to Urdhwashwas.

Among the four pattern of pathogenesis and occurrence of symptoms in Rajayakshma - Dhatukshayajanya (due to depletion of tissues and immunity) seems to be the most apt reason for COVID-19.

Ayurveda advocate Panchakarma (five folds Ayurvedic purification therapy) and Rasayana Chikitsa in pandemic condition. Mridu Panchakarma of shorter durations may be beneficial for COVID-19 as in Rajayakshma. The Achara Rasayana (behavioral therapy) is indicated in management of Janpadodhwansa and Rajayakshma. Thus it seems that COVID-19 is analogous with Rajayakshma.