Role of Rasayana in Prevention of COVID-19 - A Review

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ABSTRACT
The “Coronavirus disease 19 (COVID-19)” is caused by “Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)”, a newly discovered member of the Coronaviridae family of viruses which is a highly communicable. There is no effective medical treatment till date for Coronavirus disease hence prevention is the best way to keep disease away. Rasayana proved to be highly efficacious and cost effective for the Prevention and Control of viral infections when vaccines and standard therapies are lacking. Rasayana Chikitsa is one of the eight branches of Ashtanga Ayurveda which helps to maintain healthy life style. Rasayana improves immunity and performs many vital functions of human body. Vyadhikshamatva that is immune mechanism of the body is involved in Prevention of the occurrence of a new disease and it also decreases the virulence and progression of an existing disease. In COVID-19 the Respiratory system mainly get affected which is evident from its symptoms like cold, cough and breathlessness. Here the drugs help in enhancing immune system and strengthening functions of Respiratory system can be useful. For this purpose, the Rasayana like Chyavanprasha, Agastya Haritaki, Pippali Rasayana, Guduchi, Yashitmadhu, Haridra, Ashwagandha, Tulsi are used. Rasayana working on Respiratory system are best for Prevention of Coronavirus and boosting immune system. Rasayana Chikitsa can be effective in the Prevention as well as reducing symptoms of COVID-19.

INTRODUCTION
The “Coronavirus disease 19 (COVID-19)” is caused by “Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)”, a newly discovered member of the Coronaviridae family of viruses which is a highly communicable which emerged in Wuhan, China and extend all over the world (Boulos and Geraghty, 2020). The primary target for Coronavirus is Respiratory system. Corona virus disease spreads mostly through contact with an infected person when they sneeze or cough. It also spreads by touching a surface or object infected by virus, through eyes, nose or mouth. The common symptoms of COVID-19 are pyrexia, cough and breathlessness. Associated symptoms include weakness, body ache, sore throat, loss of smell, diarrhoea and abdominal pain (CDC, 2020). The incubation period of COVID-19 ranges between 2-14 days (Covid and Team, 2020). More than 1.77 million cases have been accounted in more than 210 countries and union territories at April 2020, causing more than 108,000 deaths. The number of recovered people is more than 404,000 (Skiera et al., 2020). Diagnosis
can be made from samples obtained by a nasopharyngeal swab, similarly samples from nasal swab or sputum may also be used. The Respiratory system is the most affected system by COVID-19 because the virus enters the host cells through the enzyme angiotensin-converting enzyme 2 (ACE2), which is abundantly present in type II alveolar cells of the lungs (Letko, 2020). Rasayana are compounds or herbs that support the functioning of the immune system including the production of immune cells, detection of antigens, and the elimination of infectious agents. As no effective medical treatment till date for Corona virus disease, Prevention is the best way to keep disease away. Rasayana is the highly efficacious and cost-effective therapy for the Prevention and Control of viral infections when vaccines and standard therapies are lacking.

Need of study:
Now-a-days there is a gradual decrease in immunity of human beings. Many new and incurable diseases are spreading worldwide. COVID-19 is one such viral diseases. Currently there is neither effective antiviral drugs nor effective vaccines are available for COVID-19. Prevention is the best strategy to deal with it. Hence it is necessary to boost immunity in order to prevent this disease. It is possible with Rasayana Chikitsa (Rejuvenating therapy). Rasayana plays important role in boosting immunity for Fighting and Preventing from COVID-19. This review aims to study the role of Rasayana described in Ayurveda in Prevention of COVID-19.

METHODOLOGY
Relevant data was collected from Ayurvedic classical books; internet and research articles were searched from PubMed and Google Scholar.

Observations and Results
Concept of Immunity in Ayurveda-
Immunity is the defence mechanism of body that protects against disease by identifying and destroying pathological organisms. It identifies variety of pathogens like viruses, bacteria, fungus and parasitic worms, and have ability to destroy them. The immune system mainly protects the body from foreign matters that causes damage by disturbing the homeostatic balance. Principles of Vyadhikshamatva in Ayurveda are free from ailments and lead healthy and wealthy life (Byadgi, 2011). Various factors which contribute towards Vyadhikshamatva are normal Doshas, equilibrium state of Dhatu, normal Agni and patency of Srotas (microchannels) (Singh and Verma, 2012). Vyadhikshamatva is involved in Prevention of the occurrence of a new disease and it also decreases the virulence and progression of an existing disease (Singh, 2015). Vyadhikshamatva is an attribute of inherent Ojas, Dhatu or vital immune strength. Immunomodulation is a process which can adjust the immune system of an organism by interfering with its functions and results in development of immune reactions that in turn decline the inflammatory response. Rasayana means the way for achieving excellent Rasaadi seven Dhatus.

Concept of Rasayana
The Dravyas which promotes the Dhatus are known as Rasayana. Rasayana therapy is one which delays the Jara (old age) and helps to Cures the diseases. Hence Rasayana is used for promotion of strength in the healthy, for Prevention as well as Curative purpose of the diseases.

Types of Rasayana
Dravyabhuta Rasayana and Adravyabhuta Rasayana (Achara Rasayana) are two types of Rasayana. According to the mode of administration Rasayana is divided into Kutipraveshika Rasayana (Intensive indoor rejuvenate regimen) and Vattatapika Rasayana (Outdoor rejuvenate regimen) (Singh, 2014). On the basis of diet and life styles it is categorized into Aushdha Rasayana (Drug based Rasayana), Ahara Rasayana (Dietary Rasayana) and Achara Rasayana (Life style Rasayana) (Rahul and Pankaj, 2009). According to the purpose there are three types of Rasayana namely Naimittika, Ajasrika and Kamya Rasayana Naimittika Rasayana is the type of Rasayana therapy used for specific Curative purpose. It accelerates the recovery from prevailing diseases. Ajasrika Rasayana is used in improving health and preserving good healthy lifestyle, diet or exercise. It involves utilization of milk, ghee, honey and maintenance of discipline life style. Kamya Rasayana is used to improve certain function that is desirous.

Chyavanprasha, Agastyaa Haritaki and Pippali Rasayana are mainly indicated in disorders of Respiratory system like cough, asthma and hic-cough. They also help in increasing immunity and strengthening Respiratory organs.

Guduchi (Tinospora cordifolia), Yashtimadhu (Glycyrrhiza glabra Linn.), Haridra (Curcuma longa Linn.), Ashwagandha (Withania somnifera), Tulsi (Ocimum sanctum Linn.) and Triphala are mainly used for enhancement of immune system. Some research studies proved the immunity boosting property of Rasayana are mentioned in Table 1.
**DISCUSSION**

Probable mode of action of Rasayana

*Rasayana* helps to improve digestion and metabolism as well as microcirculations, thus allowing to obtain the best qualities of all *Dhatus*. *Rasayana* acts on seven *Dhatus* which further improves the *Oja* which is responsible for producing good immune power in the body. This *Oja* gives immunity to the body by nonspecific way mediated through neutrophils and monocytes and by specific way mediated by B lymphocytes which acts against the virus and bacterial pathogens. Humoral mediated by B lymphocytes become plasma cells and produces immunoglobin which destroys antigens. Majority of *Rasayana* drugs works on numerous organs by improving their functions by acquiring *Vyadhikshamatva* through its appetizer, digestive, cognition enhancement, antioxidant, adaptogenic and immunomodulators properties are as shown in Figure 1 (Bhinde, 2013).

**Ayurveda & COVID-19**

As the changes in lifestyle and environment are bound to happen, newer conditions are gaining to come up hence it can be tackled as per the *Tridosha* theory explained in classics of *Ayurveda*. Acharya *Sushruta* has described *Aupasargika rogas* i.e. communicable & contagious diseases which can be transmitted through breathing or touching. Centre for Disease Control & Prevention (Tavakoli, 2020) says that human Corona viruses are most commonly spread between an infected person and others by touching infected surface, coughing or sneezing (WHO, 2020). In *Ayurveda* a term called “*Srotas*” i.e. Channel or path which carry essential nutrients to different organs, acts as one of the significant factors in the pathogenesis of diseases. Obstruction in the *Srotas* is one of the processes in pathogenesis of disease. The transportation & transfusion of *Pranavayu* is the main function of *Pranavaha Srotas* (Respiratory system). This *Pranavaha Srotas* gets vitiated because of various reasons like *Raja* (dust particles containing viruses), *Dhuma* (smoke containing air pollutants) *Sheetasthana* (cold environment). This *Raja* when enters through mouth and nose develops disease like *Kasa* (cough), *Hikka* (hiccups), *Shwasa* (asthma), *Pratishaya* (running or stuffy nose) which are similar to Coronavirus.

**Prevention and management of COVID-19 through Rasayana**

*Pranavaha Srotas* carries *Pranavayu*, in connection (mooolsjna) with *Hruday* (heart) and *Dashadhamanis*. In COVID-19 the Respiratory system mainly get affected which is evident from its symptoms like cold, cough and breathlessness. Here the drugs working on Respiratory system and strengthening its functions can be useful. For boosting immune system for Prevention of Coronavirus *Giloy, Tulsi, Agastya Rasayana, Pippali Rasayana* are the best *Rasayana* working on *Pranavaha Srotas* (Respiratory...
Table 1: Following research studies proved the immunity boosting property of Rasayana

<table>
<thead>
<tr>
<th>Year of Publication</th>
<th>Author</th>
<th>Title</th>
<th>Treatment given</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>2017 (Gupta, 2017)</td>
<td>Arun Gupta, Sunil Kumar, Sanjeeva Dole et al</td>
<td>“Evaluation of Chyavanprasha on Health and Immunity related Parameters in Healthy Children: A Two Arm, Randomized, Open Labelled, Prospective, Multicentre, Clinical study”</td>
<td>(Gr-A) (N=313): Chyavanprasha orally two times followed by a cup of milk daily. (Gr-A) (N=314): A cup of milk only twice daily for 6 months</td>
<td>Results showed more than 2 times protection from immunity related illness in Chyavanprasha Group as compared to the Control group. It also showed better percentage improvement in energy levels, physical fitness, strength, stamina and quality of life.</td>
</tr>
<tr>
<td>2015 (Sharma and Sharma, 2015)</td>
<td>Devasya Narayana Sharma, Ajitha Sharma</td>
<td>Tinospora cordifolia enhances Vyadhiiksha matwa (immunity) in Children</td>
<td>(Gr-A) (N=200): Tinospora cordifolia powder (Gr-B)(N=200): Placebo (wheat flour) for 2 months</td>
<td>Tinosporacordifoliashowed statistically significant increase in TLC, ALC and lymphocyte percentage as compared to Placebo.Hence it can be used as an adjuvant to vaccination in order to boost the immune system.</td>
</tr>
<tr>
<td>2012 (Debnath, 2012)</td>
<td>P. K. Debnath, Jaydeb Chatopadhyay, Achintya Mitra et al.</td>
<td>“Adjunct therapy of Ayurvedic medicine with anti-tubercular drugs on the therapeutic management of pulmonary tuberculosis”</td>
<td>(N=99): ATD as an adjunct with Ashwagandha (Withaniasomnifera) and a multi-herbal formulation Chyavanprasha</td>
<td>Body weight showed improvement, appreciable change in IgA and IgM patterns and significantly increased bioavailability of isoniazid and pyrazinamide were recorded.Hence it brings up solutions in public health initiatives to boost health care delivery system in India in pulmonary tuberculosis care.</td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Study Title</th>
<th>Study Details</th>
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<tbody>
<tr>
<td>2010</td>
<td>Gupta et al., 2010</td>
<td>“Clinical Evaluation of Shilajatu Rasayana in patients with HIV Infection”</td>
<td>(Gr-A) (N=12): ART along with Shilajatu Rasayana for 3 months (Gr-B) (N=8): HAART Therapy from the AIDS Clinic of Modern Medicine</td>
</tr>
<tr>
<td>2010</td>
<td>Chandelohm, 2010</td>
<td>“Role of Rasayana in Cure and Prevention of Recurrence of Vicharchika (Eczema)”</td>
<td>(Group SR) - Guduchi-Bhringaraja Rasayana with external application of Snuhyadi Lepa (Group S) - Shirishadi decoction administered orally with external application of Snuhyadi Lepa for 60 days</td>
</tr>
<tr>
<td>2009</td>
<td>Deepti Bisht et al</td>
<td>“A Clinical study to evaluate the efficacy of Pippali-Rasayana in certain Respiratory disorders”</td>
<td>68 patients of HIV positive divided into two groups, one receiving TCE and other placebo for six months.</td>
</tr>
<tr>
<td>2008</td>
<td>Thawani et al., 2008</td>
<td>“Immuno modulatory effect of Tinospora cordifolia extract in human Immunodeficiency virus positive patients”</td>
<td>Pippali Rasayana helps in increasing Hb% and reduction in ESR also showed improvement in frequency and duration of exacerbation. Hence it is very much effective in the management of Respiratory diseases as an adjuvant</td>
</tr>
<tr>
<td>2004</td>
<td>Sur, 2004</td>
<td>“Effect of Sonachandi Chyavan prasha and Chyavanprasha Plus–two herbal formulations on immune modulation”</td>
<td>Both the drugs increased the macrophage activity and enhancement of non-specific immune response and reduction of chances of infection.</td>
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Shilajatu Rasayan enhances the immunity by increasing CD4 T helper cell counts, prevents the resistance of HIV virus to ART drugs also decreased the intensity of the Clinical symptoms and signs thereby protected the liver from the hepatotoxicity of ART.

No recurrence was reported in Group SR due to addition of Guduchi-Bhringaraja Rasayanawhile recurrence rate was more in Group S.

Tinosporacordifolia extract, group showed significant improvement in reduction of symptoms due to immunostimulant, property of Tinosporacordifolia so they concluded that it could be used as an adjunct to HIV/AIDS management.

Both the drugs increased the macrophage activity and enhancement of non-specific immune response and reduction of chances of infection. Protected Cyclosporine A induced immunosuppression suggesting the immunoprotected role of the aforesaid herbal formulations.
system). Tribhuvankirtiras, Laxmivilasras, Mahalakshmi Vilas ras, Chitrik Haritaki, Eladi vati, Talisadichurna, Sitopaladichurna, Kantakarighrita, Vasa ghrita can be used due to their antipyretic, antiallergic, immunomodulatory, anti-inflammatory and analgesic properties. Kantakari (Solanum surattense Burm. f.), Pushkarmool (Inula racemosa Hook. f.), Haritaki (Terminalia chebula Retz), Pippali (Piper longum Linn.), Tulsī (Ocimum sanctum Linn.), Brihati (Solanum indicum Linn.) and Amalaki (Emblica officinalis Gaertn.) can be used in Pranavaha Strododushti for strengthening it.

Health is defined as a “state of complete physical, mental and social well-being and not merely an absence of disease or infirmity to lead a socially and economically productive life” (Park, 2011). Ayurveda can be used effectively in the management of immune-compromised conditions like acquired immune deficiency syndrome (AIDS), Tuberculosis and malignancy. The Rasayana therapy or rejuvenation therapy makes it easily possible with its remarkable benefits on immunity, health, longevity, regeneration of cells and tissues in the body. Rasayana as immunomodulator herbs are perhaps the only drug that can be taken securely for long period, even in a healthy state, without any specific contradictions. Acharya Charaka has described Chyavanaprasha which rejuvenated Chya vana Kishi whereas Acharya Sushruta described many Rasayana formulations that increase the life span and refers to them as Ayuskara. Rasayana therapy has various beneficial effects on our body like Jarayadvih Nashana, promotion of body strength including immunity, promotes body tissues and alleviation of disorders. Immunomodulators corrects the immune functioning that is out of balance. The immunomodulators have ability to stimulate natural and adaptive defence mechanism of the body that can be helpful in boosting immunity for Prevention of COVID-19.

CONCLUSIONS

Rasayana are effective in enhancing immunity of the body. Rasayana working on Respiratory system helps in strengthening function of Respiratory organs as well as reducing symptoms of Respiratory disorders. Immunity plays an important role in Prevention of diseases. So, it can be concluded that Rasayana Chikitsa can be effective in the Prevention as well as reducing symptoms of COVID-19.

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Conflict of interest

The authors declare that they have no conflict of interest for this study.

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