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A ROLE OF HERBO-MINERAL FORMULATIONS IN MAINTAINING AGNI, IMMUNITY AND TREATMENT OF COVID-19.

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ABSTRACT

Ayurveda is the science of life and longevity. Ayurveda being a holistic and ancient science it advocates wise use of some herbo-mineral formulations. Herbo-mineral formulations have their benefit of having low dose and proven efficacy in symptoms that occurs in Covid-19. Herbo-mineral formulations are rich in essential micronutrients and helps in modulating immune response in Covid-19. Some of Herbo-mineral formulations are *Lakshmvilas Rasa*, *Swarna malati vasant*, *Swarna Bhasma*, *Yashada Bhasma*, *Shwasa kuthar Rasa*. Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus, SARS-CoV-2, a Baltimore class IV Positive-sense single stranded RNA virus.

Coronaviruses are group of RNA viruses that infects mammals and birds, causing mild to lethal respiratory tract infections. Earliest infections of coronavirus in animals occurred in late 1920's. Human coronaviruses were discovered in 1960's. The risk factor for coronaviruses vary significantly, as MERS-CoV can kill more than 30% of those infected. SARS-CoV discovered in 2003 had unique pathogenic feature as it

causes both upper and lower respiratory tract infections. Most people infected with the COVID-19 virus experience mild to moderate respiratory illness and recover without requiring special treatment.

The severity of response to virus depends on immunity of the host. Ayurveda instead of immunity holds belief on the Agni. Concept of Agni is very deep and it assumes that each tissue of the body functions properly only when its specific *agni* is normal. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. For treatment of mild and moderate cases of Covid-19 patients entire medical field is striving hard. Each pathy is trying its level best to defeat this pandemic. Ayurveda has also lifted a bow to hit at this pandemic.

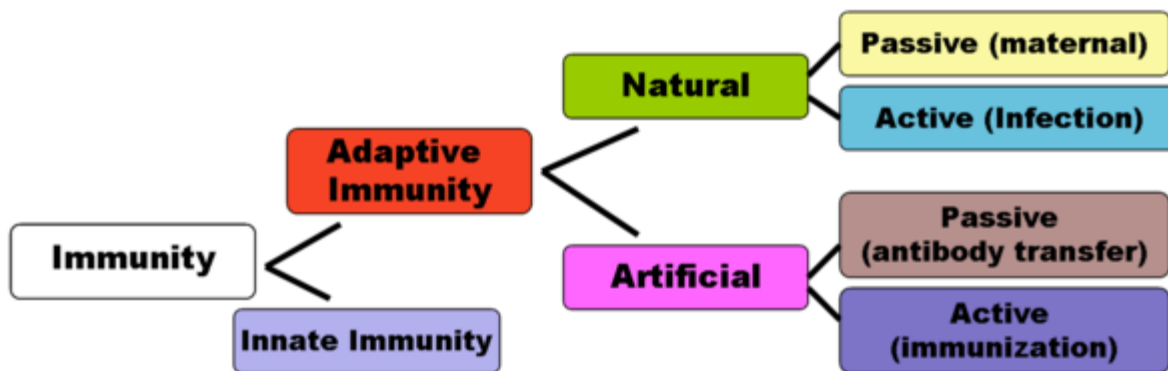
KEYWORDS- Coronavirus, *Yashada Bhasma*, *Shwasa Kuthar Rasa*, *Agni*, immune response.

INTRODUCTION

Ayurveda is an ancient science which believes in maintaining normal health and cure of diseased. Ayurveda advocates healthy food habits and daily regime for health. *Ahara*, food has been called as *Mahabhaishajya*, super medicine in Ayurveda. As per Ayurveda, if one takes proper food and follow daily regime one can have long, healthy and prosperous life. Six first row d-block metal ions Mn, Fe, Co, Ni, Cu, Zn are essential micronutrients in living organisms. Their role as metallo-enzymes is always matter of interest. The trace metal homeostasis is the concept in which balance between nutrition and toxicity is maintained. As well as 'nutritional immunity' concept has emerged in the context of host defence against pathogens¹.

Agni- It is broadly called as digestive fire, which digests all the macro and micro-nutrients taken by mouth. If the Agni vitiates then it can't properly metabolise and absorb the nutrients taken. It then makes the residue in much more quantity called as *Ama* which causes blockade of various nutrition channels leading to deficiency of macro, micro-nutrients at tissue level. This condition then proliferates into improper functioning of the tissues and eventually organs. Then various signs and symptoms manifest the disease. So the Agni is having pivotal role in disease development. *Agni* is not only confined to digestive fire but it acts at every tissue level also, called as *Dhatvagni*. It has major role in building up of proper tissue by using macro-nutrients and maintaining its function with help of micro-nutrients which plays role in various enzymatic processes. *Bhutagni* is the type of Agni which takes up and utilises the macro-nutrients specifically at level of liver. Both, *Dhatvagni* and *Bhutagni* are depend on Agni. If *Agni* is vitiates both of these gets vitiates usually. So the Agni plays crucial role in digestion, absorption, assimilation and homeostasis of macro and micro-nutrients.

Immunity- Immunity can be defined as a complex biological system endowed with the capacity to recognize and tolerate whatever belongs to the self, and to recognize and reject what is foreign (non-self). There are 2 main types of immunity, one Innate and another is Adaptive.



There is a difference in between immune boosting and immune modulating. As principles of Ayurveda believes in maintaining normalcy, it is better to modulate it despite only boosting the immunity. As per Ayurveda, Immunity can be correlated with number of factors like *Sahaj Bala*, *Dhatu sarata*, *Oja*.

By nutritional angle if we asses, food can be divided into basically 2 categories-

1. Macronutrients (Staple food) - Rich in carbohydrates, proteins and fats providing energy
2. Micronutrients- Macro-Minerals, Trace minerals, Water sol. & Fat soluble vitamin, plays crucial role in different physiological process by participating in different enzymatic processes.

As per the Ayurveda, *Agni* and *Sharira Bala* is very essential for immunity of body. The utility of trace elements in Immunity is well established. Human body needs trace minerals namely Iron, Boron, Copper, Zinc, Molybdenum, Selenium and Manganese is shown in table no.1. Role of some commonly used herbo-mineral formulations in Covid-19 is given in Table No.2.

Table No.1 showing details of some micro-elements-

Mineral	Function	Food Source	Rasashatriya Dravya
Iron	Formation of Haemoglobin	Organ meats, red meats, fish, poultry, egg yolks, legumes, dried fruits, dark, leafy greens, iron-enriched breads and cereals, and fortified cereals	<i>Abhraka Satva, Makshika, Vimal, Loha, Gairik, Kasisa</i>

Zinc	Part of no. of enzymes needed for making protein and genetic material, important in taste perception, mental strength, Foetal development, sperm production, normal growth, sexual maturation, role on Immune system	Meats, fish, poultry, leavened whole grains, vegetables	<i>Rasaka, Yashada, Vanga</i>
Copper	Part of many enzymes needed for iron metabolism	Legumes, whole grains, nuts and seeds, organ meats, drinking water.	<i>Makshika, Vimal, Tamra,</i>
Selenium	Antioxidants	Sea food, Meat, grains.	<i>Chapala</i>

Table.No.2 showing details of commonly used herbo-mineral formulations-

Formulation	Therapeutic Uses	Detailed uses and Possible Mode of Action
1) <i>Mahalaxmivilas Rasa</i>	<i>Shwasa, Kasa, Kshayaj Sanniapata, Pratikshya, Kamala</i>	1) As it contains Swarna, Raupya, Abhraka, Tamra, Vanga and Loha Bhasma, there might be chances of its key role in providing micronutrients to different organs. 2) Abhraka bhasma is useful in Lung diseases. It gives strength to lungs ⁱⁱ . 3) Useful in emaciated patients of Jwara ⁱⁱⁱ .
2) <i>Shwasa Kuthar Rasa</i>	<i>Shwasa, Kasa, Vata-Kaphaj vikara, Pratikshaya, Kshatakshina</i>	i) It contains Kajjali, Borax, Manshila. Borax is widely used in cleaning actions. ii) It is widely used as expectorant which clears mucous plug from the respiratory tract and maintains its patency. iii) <i>Manashila</i> is potent anti-bacterial in nature.
3) <i>Sameerpannaga Rasa</i>	<i>Sannipataja Jwara, Vata-Kaphaj vikara</i>	i) As it is a <i>kupipakwa</i> yoga, it is very potent and fast acting.

		<p>ii) It is primarily used in respiratory infections and its complications because of its arsenic containing compounds.</p> <p>iii) It is also used in pleural effusion and its complications. It acts by stimulating mucous production and its expectorant action^{iv}.</p> <p>iv) It acts as stimulant and strengthening agent to respiratory system.</p>
4) <i>Swarnamalati Vasant</i>	Dhatu kshaya, Kshya, Jeerna Jwara, Sangrahani, Atyartava	<p>i) As it is formulation of <i>swarna</i> it gives strength to all physiological systems.</p> <p>ii) It gives strength to gastrointestinal organs which helps in proper absorption and assimilation of all macro and micro nutrients^v.</p> <p>iii) It helps in Dhatu Upachaya and renders vitality of body.</p> <p>iv) It is used both in <i>Anuloma</i> and <i>Pratiloma Kshaya</i>.</p> <p>v) Very useful in <i>Jeerna Jwara</i> where loss of appetite and Splenomegaly are main symptoms^{vi}.</p> <p>vi) Here it is basically used for increasing the vigour and vitality lost due to long standing jwara.</p>
5) <i>Swarna Bhasma</i>	Jwara, Kasa, Shwasa, Atisara, Rajayakshma, Vishagaraharam, Medha smritikar, Ruchivardhan, Hridya	<p>i) As gold has a pivotal role in electrical signals transmission, joint activity, lymphatic system it is very crucial in maintaining smooth functions of body.</p> <p>ii) The gold nanoparticles presents haptens to T-cell and 10 fold increase in its activation as well as influence the function of lymphocytes^{vii}.</p> <p>iii) Gold Nanoparticles was determined in various regions in the brain (i.e. hippocampus</p>

		frontal cortex, entire cortex, cerebellum and hypothalamus) of rats ^{viii} , results in prevention of cognitive deficits and oxidative stress in Animal Studies.
6)Yashada Bhasma	<i>Sarvemehaghnam, Chakshushya, Kshayaghnam, Kapha-pitta vikara nashak.</i>	<p>1) As it is nanoparticle of zinc that helps in many enzymatic reactions of body.</p> <p>2) Pancreatic Beta cells has highest concentration of zinc in its secretory granules. More than 600 proteins and calcium, Zinc, magnesium and phosphate ions in the granules^{ix}. Thus we can say that Yashada bhasma can play a main role as anti-diabetic agent.</p> <p>3) Delayed Hypersensitivity and cytotoxic activity are suppressed during zinc deficiency and reversed by zinc supplementation. Zinc deficiency blocks development of B lymphocytes in the marrow.^x Developing immune response through T-cells, neutrophils and NK cells. So we can say that zinc supplement can be very useful in modulating immunity.</p> <p>4) Zinc helps in the myogenesis and regeneration due to its effects on cell activation, proliferation and differentiation^{xi}. So we can say that thus zinc acts as <i>Kshayagnam</i>.</p>
7)Chaushastha Prahar Pippali	<i>Hikka, Kasa, Shwasa, Mandagni, Pliha vridhhi, Udara vikara</i>	<p>1) <i>Pippali</i> being most potent anti-oxidant helps in scavenging free radicals and reducing oxidative stress^{xii}.</p> <p>2) Decoction of <i>Piper longum</i> shows marked anti-inflammatory activity^{xiii}.</p>

		<p>3) Piperine is considered to be useful in increasing bioavailability of drugs^{xiv}.</p> <p>4) Aqueous suspension has shown promising analgesic effect in both rats and mice^{xv}.</p>
8) <i>Panchamrita Parpati</i>	<i>Grahani, Yakshma, Atisara, Jwara</i>	<p>1) It improves digestion and absorption of nutrients.</p> <p>2) As it contains <i>tamra bhasma</i>, it specially acts on liver, pancreas and small intestines.</p> <p>3) Copper is necessary for the growth and formation of bone, formation of myelin sheath, helps in incorporation of iron in haemoglobin, assist in absorption of iron from the GIT^{xvi}.</p> <p>4) Neutropenia is clinical sign of copper deficiency. Arrest of maturation of granulocytes in copper deficiency^{xvii}. So we can say that by Cu supplementation we can increase Innate immune response.</p>
9) <i>Tribhuvan kirti rasa</i>	<i>Sannipata jwara and sarv jwarahar</i>	<p>1) As it contains of purified aconitum, its small doses of medicines made from the extract to treat pneumonitis as well as pleurisies^{xviii}.</p> <p>2) Aconitum used to increase sweating by virtue of it, used in fever^{xix}.</p> <p>3) Aconitum is used as hepato-stimulant, pain reliever and appetizer^{xx}.</p>
10) <i>Vatagajankush Rasa</i>	<i>Vataj vikara, Gridhrasi</i>	<p>1) As this is having <i>loha</i> and <i>makshik bhasma</i>, so we can say that it can easily supply micro-minerals and useful in many <i>Vataj Vyadhi</i>.</p>

		<p>2) <i>Trikatu</i> and <i>Vatsanabha</i> are <i>ushna veerya</i> drugs which are useful in pacifying vitiated <i>Vata</i>.</p> <p>3) <i>Shuddha Gandhaka</i> and <i>Hartala</i> used in this, so that it can help in pacifying vitiated <i>Kapha</i>.</p>
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DISCUSSION- A Covid-19 is the disease which affects multiple organs of our body, more specifically Lungs. Major manifestations of this disease is respiratory illness like shortness of breath, difficulty in breathing Dry and wet cough, high grade fever. Basically it attacks on lung tissue causing its collapse and deteriorate the oxygen saturation which is the main thing to be taken care of. As the lungs are formed from the foam of blood in embryonic development, we can correlate this to the *Kapha* residing in blood. So the line of treatment is to avoid excess *Kapha* (mucus) production or very less. So as per the need and clinical condition the medicine is used. As per Ayurveda some medicines can be very useful to treat various challenging conditions arising in patients of Covid-19. *Mahalaxmi Vilas Rasa*, *Shwasa Kuthar Rasa*, *Ttribhuvan Kirti Rasa*, *Sameerpannaga Rasa*, *Chausashtha Prahara Pippali* are basically used in alleviating *Kapha*. It helps to restore normal condition of lungs by expectorating excess mucus and dilating bronchus. *Swarna Bhasma*, *Yashada Bhasma* can be used to treat trace elements deficiency. These *bhasmas* acts as *Rasayana* by replenishing the trace elements which by its virtue helps in several metabolic activities. It can act as Metallo-enzymes in trace form which might speed up the metabolic processes. *Vata Gajankusha Rasa* is very useful in alleviating excruciating pain caused by vitiated *Vata*. *Swarna Malini Vasant* can help in boosting the Agni eventually metabolic rate of body. It gives new strength to all the organs. Due to its activity in all the physiological system it rejuvenates the whole body imparting strength and energy.

Agni is the main thing of the living organism which is essential for maintaining the life. Agni itself is very complex thing to understand but if we divide it in basic 3 parts namely *Jatharagni*, *Dhatvagni* and *Bhutagni*. *Jatharagni* is useful in digesting the food and medicines we take. *Bhutagni* acts in the metabolism of different minerals, helps in its proper absorption to be processed. *Dhatvagni* acts at various tissue level which helps in proper utilization of absorbed minerals. So these 3 types of Agni synchronically acts to digest, absorb and utilization of minerals in body. Concept of *Dhatvagni* can be correlated with various metabolic reactions taking place at specific tissue level. For these reactions to be very proper some trace minerals place very crucial role like Cu, Zn, Mn, Se. So these minerals are very much important in maintaining normal health.

Immunity can be called as additive product of *Agni* and *Bala*. *Agni* makes the *Bala* of *Sharira* by building up of tissues. So for proper immunity to fight with diseases there should be *uttama agni and sharira*

bala. These both can be properly achieved by taking food rich in macro and micro elements as well as by observing daily regime along with seasonal *sharir shuddhi* by Panchkarma. So as per Ayurveda it is useful to take some adjuvants as *Rasayana* to maintain the strength of the diseased organs and body. *Rasayana* means the food or medicine which helps in *Ayana* of *Rasa*. *Ayana* means uninterrupted flow and its assimilation. So for proper *Ayana* of the *Rasa*, it is advocated to take foods rich in micro-elements which in turn maintain the healthy tissue.

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