

Review Article

Integrated prevention protocol to fight COVID-19: Creating a fine balance

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ABSTRACT

The pandemonium of COVID-19 pandemic is likely to have significant impact over the healthcare which may evolve with rise of 'Evidence-based Lifestyle Medicine [eLSM]'. Integrated protocols based on lifestyle changes, which combine Modern Medicine and Ayurveda, may offer best protection against COVID-19. Ayurvedic practices may help in creating a non-specific 'virus-hostile' mucosal environment for strong local barrier to 2019-nCoV. The healing powers of Ayurvedic herbs can help to enhance body's innate immunity which can provide strong systemic defense against COVID-19. Lifestyle choices and modifications are likely to play key role in protection against COVID-19. The 'integrated protocol' for protection against COVID-19 which is described in this article is backed with science and common-sense reasoning and reemphasizes the impact of lifestyle choices in our lives

Keywords: - COVID-19, Prevention protocol, Integrated Healthcare, Lifestyle Medicine.

The ongoing outbreak of corona virus [COVID-19] has created an unprecedented crisis. With complex interconnected nature of our world today, the pandemonium of pandemic has adversely affected every human on this planet. Let's hope that COVID-19 pandemic soon goes down the history as triumph of human's indomitable spirit and determination. COVID-19 will certainly have significant impact in every walk of walk including the further evolution of healthcare. Future healthcare is now expected to establish greater sync with the laws of the nature. Healthcare system will realign to promote lifestyle modifications as a 'way of life' rather than an 'option'. Lifestyle counseling and interventions will be based on specific evidences in terms of clinical examinations, imaging studies and laboratory investigations. 'Evidence-based Lifestyle Medicine [eLSM]', may soon acquire the centre stage as mentioned in my previous blog (1,2).

In today's era of internet and social media, the problem of COVID-19 has indeed grown much more beyond the medical illness alone. Amidst infodemic of scientific publications, healthcare blogs and expert comments, it is difficult for the common person to decide the correct prevention protocol to fight COVID-19. It is mandatory to follow authorized portals rather than feeling exhausted and overwhelmed with information overload. The public should be aware of the myths surrounding the corona virus and look for solutions based on science and common sense (3). As novel corona virus is a new threat, we cannot expect to have full-proof scientific evidence to decide the prevention and treatment protocols. The pathophysiology of respiratory viruses is largely based on the understanding of influenza A virus. It is safe to assume that if this virus transmits efficiently, it has lower pathogenicity. 2019-nCoV is likely to be less pathogenic than MERS-CoV and SARS-CoV.

COVID-19 therefore poses a low health threat at 'individual level' and poses a high risk at 'population level'. It has huge potential to cause disruptions in the global public health systems and significant economic losses, as is already evident by this time.

Due to overspecialization in modern medicine, we have too many experts who can provide solutions, in-depth analysis and viewpoints during the present crisis. But in my opinion, 'while closely approaching a tree, one should not lose view of the forest'. The medical experts should not lose the 'bird's eye view of the overall problem and should adopt a balanced unbiased approach. Being an expert in a particular discipline of modern medicine does not mean that the doctor should advocate only the positive aspects of a treatment option. After all, that's what makes doctors essentially different from a sales person.

The experts need to be completely aware of both sides of the coin and should help the patient in taking an informed decision with his/her balanced views. The turf battles between the Allopathy, Ayurveda and other forms of medicine should take a backseat during the present pandemic. This is the time to evolve an integrated 'middle path' to fight COVID-19, which should integrate the best available options which are backed with science and common sense. Scientific evidence gathered from Allopathy integrated with age-old wisdom of Ayurveda is the best approach for protection against COVID-19.

Despite my training in Allopathic Medicine, I have immense interest and respect for Ayurveda and Yoga with basic understanding of its timeless concepts and practices. I have working knowledge of lifestyle medicine, which has huge potential in prevention of diseases. As an expert in Clinical Radiology, I have seen the cross-sectional anatomy of human body and observed alterations in body physiology during the disease processes in 'black and white' through the '256 shades of grey' for last 20 years. Moreover, I am not funded or biased in any way to suggest this protocol.

Everyone needs to adopt the following integrated protocol for protection against COVID-19 which should be incorporated in the lifestyle. The protocol is backed by appropriate scientific evidence and common sense and may provide a ray of hope and help the humankind in these uncertain times:

STRICTLY FOLLOW 'SOCIAL DISTANCING' AND ADOPT 'NAMASTE':

Social distancing measures need to be strictly followed during this pandemic. As human is a social creature, they need not socially distance themselves from family, friends and community. In fact, the scientific evidence supports 'Physical distancing' of at least 6 feet to break the human-human transmission chain for the virus. During the present pandemic and lockdowns, it is important to strictly follow the government guidelines, stay at home and work from home, if applicable. If it is absolutely necessary, make sure to wear an appropriate mask and take all due precautions for physical distancing at workplaces, shops, hospitals or public places.

Amidst the pandemonium of COVID-19 pandemic, the lives cannot stop and must go on. As the cycle of life brings new normal by virtue of change, the world needs to adapt to new norms to avoid infections, new ways of life and new forms of human interactions. The absurdities of yesterday may become wisdom of tomorrow and also vice versa. Now is the time to completely adopt the 'Namaste' culture to minimize further spread of infections. Namaste is a non-contact form of greeting in Hindu culture and is the deepest form of respect. The gesture acknowledges the belief that there is a divine spark within each of us, where Namaste means, 'I bow down to the divinity within you'.

PERSONAL HYGIENE, SANITATION AND CLEANLINESS MEASURES

As 'Cleanliness is next to Godliness'; personal hygiene and cleanliness measures are extremely important in our fight against COVID-19 and to save ourselves and others [4]. Good personal hygiene is an effective barrier to infectious diseases, including COVID-19 and it also promotes better health and well-being. Frequent handwashing is the best way for protection from infections at all times. Appropriate use of soap and water or an alcohol-based (at least 60%) hand sanitizer with scrubbing for at least 20 seconds is mandatory. In fact, Sir William Osler has mentioned 100 years ago, that "soap, water and common sense are the disinfectants", which is even applicable today.

The standard advice for the correct way of handwashing during the COVID-19 pandemic is

available at the following link: <https://www.cdc.gov/handwashing/when-how-handwashing.html>. The panic and fear of COVID-19 has also promoted over-enthusiastic and expensive personal hygiene measures which often defies scientific logic or lacks common sense. The healthcare professionals who have completely covered themselves with personal protection gowns for interactions with the suspected patients and are intermittently roaming all over the hospitals and interacting with others staff during the non-patient hours are a major threat to healthcare community.

Common sense approach and concern for others is extremely important aspect of personal hygiene. The use of appropriate masks is mandatory for safety of individuals at community and healthcare settings. The standard advice from World Health Organization regarding the correct use of masks during the COVID-19 pandemic is available at the following link: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks>.

CREATING A 'VIRUS-HOSTILE ENVIRONMENT' IN RESPIRATORY MUCOSA

We need to understand the concept of 'mucosal microenvironment'. The innermost lining of upper or lower respiratory tracts (airways) is covered by 'mucosa', which provides interface for air conduction and oxygen exchange. These mucosal surfaces are not simply conduction tubes, as they have complex functions including local immunity, muco-ciliary movements and air filtration. The mucosa has an intrinsic microenvironment – 'mucosal micro-environment', which depends upon the degree of acidity / alkalinity (pH value), temperature, humidity and range of normal bacterial flora. In healthy states, mucosal immune system provides protection against pathogens but maintains a tolerance towards non-harmful commensal microbes and benign or inert environmental substances. The oral microbiome is the primary source of the bacterial microbiota in human lungs during health. These factors need to remain in balance to maintain the state of perfect health of mucosal microenvironment in the respiratory tree.

In case of inciting factors, like exposure to extreme cold and moisture while sleeping in an air-

conditioned unit or overconsumption of ice-cream may lead to imbalance in these local factors. The degree of imbalance may vary from person and has the potential to disrupt the mucosal environment. The response of the body to this altered state may incite inflammatory response – 'mucositis'. The mucositis may clinically manifest as soreness of throat, running nose or cough. During altered state of mucosal environment, the mucosa becomes vulnerable to the onslaught of respiratory pathogens and clinical disease may manifest.

The stated patho-physiology for respiratory pathogens is applicable to Corona-virus, which may attach the mucosal ACE receptors in the nasal cavity, paranasal sinuses, nasopharynx and oropharynx during the initial exposure. Creating a non-specific 'virus-hostile' environment at the level of mucosa is surely a promising preventive approach. These measures will impact the local factors like acidity / alkalinity (pH value), temperature, humidity and their mutual balance to ensure healthy mucosal microenvironment. Perfectly healthy mucosal microenvironment will certainly offer best natural resistance to attacks by respiratory pathogen including the Corona-viruses.

Accordingly, the population should adopt the following measures to prevent COVID-19. These house-hold measures are cheap, easily available, do not need expert supervision and will certainly not cause any side-effects, even if followed regularly for long time. The mean incubation period of 2019-nCoV is estimated to be 6.4 days (95% credible interval: 5.6–7.7), ranging from 2.1 to 11.1 days (2.5th to 97.5th percentile) (5). The measures to maintain the virus-hostile mucosal environment therefore need to be repeated at least 4-5 times a week and should become part of the regular lifestyle.

SALINE WARM WATER GARGLES AND STEAM INHALATION

The upper airways mucosal structures are particularly sensitive to temperature and humidity, as optimal mucociliary clearance is achieved at 37° Celsius and 100% relative humidity. Cold temperatures and low humidity are associated with increased risk of respiratory infections (6,7). Acute cooling may cause reflex vasoconstriction in the sino-nasal mucosa, which adversely impact the mucosal microenvironment and the consequent respiratory defense. This predisposes the individual

to viral infections or converts an asymptomatic subclinical viral infection into a symptomatic clinical infection (8). Saline gargles and steam inhalation removes pathogens and particulate matter due to marked increase in the mucosal muco-ciliary movements (9). The regular early morning practice of saline warm water gargles and steam inhalation regulates the local temperature and humidity and helps in maintaining the normal health of mucosal microenvironment. This is certainly a great way to prevent COVID-19 and other respiratory pathogens.

DRINKING WARM WATER

Drinking warm water in the morning and intermittently throughout the day is revered in Ayurveda. Warm water effectively hydrates our bodies due to better absorption. As per Ayurveda, Water should be taken at room temperature or hot, but never ice-cold, as that would almost certainly douse the digestive fire. 'Ama' is the Ayurveda's collective name for all type of toxic impurities of digestive process. Preventive measures to avoid build-up of Ama in body tissue are crucial for health. Drinking warm water is the best way to minimize accumulation of 'ama'. Studies have shown that warm water intake increases nasal mucus velocity and nasal airflow resistance to remove pathogens (10). The practice of drinking warm water will restore the mucosal microenvironment and may enhance mucosal barrier to COVID-19, apart from providing the essential hydration to the body.

APPLE CIDER VINEGAR / FRESH LEMON WITH HONEY AND WARM WATER

Mucus is an important component of nasal mucosal environment which serves as barrier to pathogens at the mucosal interface. It is produced by submucosal seromucous glands. Normal nasopharyngeal mucus is slightly acid with a physiological pH-value of 5.5–6.5 and has a small capacity as chemical buffer (11). The normal nasal mucosal pH increases to 7.2-8.3 during an episode of nasal inflammation. As in gastric mucosa, acidic pH of nasal mucosa provides resistance against respiratory pathogens. Several respiratory viruses are known to be sensitive to low pH and are inactivated by acidic conditions (12). A study has also described the role of nasal irrigation for temporary lowering of nasal pH as a mode of treatment for common cold (13). Apple Cider Vinegar (20-25ml) mixed with honey and warm water is an excellent way to start the day which can

be used for gargles and oral intake. This provides a mildly acidic solution for maintenance of mucosal milieu.

Ayurveda has described high therapeutic value of honey in prevention and treatment of respiratory disease and emphasize the benefits of daily consumption. For centuries honey is considered to be packed with nutrition and has many medicinal values including antibacterial and antifungal properties. Honey is known as the best remedy for treatment of cough. The thick consistency of honey helps coat the throat and the sweet taste of it is considered to trigger the nerve endings that protect the throat from incessant coughing. Apple Cider Vinegar (20-25ml) mixed with honey and warm water should be consumed at least 4-5 days in a week on empty stomach. Excessive consumption of Apple Cider Vinegar without dilution may weaken the tooth enamel and may cause tooth decay. It is therefore important to follow the stated instructions carefully.

As an alternative option, Apple Cider Vinegar may be replaced by few drops of fresh lemon, which again provides a mildly acidic solution and is a great way to start the day. Lemons contain both citric and ascorbic acid, weak acids easily metabolized from the body allowing the mineral content of lemons to help alkalize the blood. Disease states only occur when the body pH is acidic. Drinking lemon water regularly can help to remove overall acidity in the body, including uric acid in the joints, which is one of the primary causes of pain and inflammation. Apart from pH balance, warm lemon water with honey also aids in digestion and boosts respiratory immunity,

NASAL APPLICATION (NASYA) WITH SESAME OIL / COCONUT OIL OR GHEE.

Nasal application of herbal oils through nasal route [Nasya] provides optimal moisture to the air and enhances the mucosal microenvironment and therefore offers protection against respiratory pathogens. Apart from this, the role of nasya in enhancing cerebral functions and prevention of migraine headache is described in Ayurvedic literature (14). Modern Medicine also accepts the importance of nasal route for trans-mucosal drug and vaccine delivery (15). Nasya should be performed only after consultation with Ayurvedic experts to decide the herbal oil, based on the body

constitution. Though sesame oil is usually preferred, it is important to rule out allergies to sesame oil. Otherwise, coconut oil or ghee may be used. It is not performed during an active infection and is only a preventive measure.

BUILDING A STRONG IMMUNE SYSTEM AS A SYSTEMIC DEFENSE

Human immune system is a host defense system comprising of biological structures and processes which protects against disease. There are two major types of immunity to infections: 'Adaptive' and 'innate' immunity, whereby both subsystems use humoral immunity and cell-mediated immunity to perform their functions.

'Adaptive immunity' is based on the 'memory' from a previous infection which offers fast, strong and specific immune response against the same or similar pathogen. 'Innate immunity' provides a broad non-specific immune response against all pathogens, irrespective of previous exposures. As 2019-nCoV is a new strain of corona virus, the adaptive immunity is not expected in human and will only be provided by the vaccines against 2019-nCoV, which are presently being developed across the globe. Till then, human's prevention against COVID-19 essentially depends on our innate immunity.

The innate immune system is the first line of defense against 2019-nCov. The nature of the host response is controlled in part by the appropriate recognition of single pathogen-associated molecular pattern by cells of innate immune system. The effector cells significantly rely on essential nutrients from the food to generate energy, produce precursors for biosynthesis of macromolecules and fine tune their immune responses. Scientific advances in genomic sequencing reveal opportunities for exploring diet-health relationships and potential for individual, genotype based dietary recommendations (16). Wide range of environmental factors can modulate human immunity in perinatal and neonatal period including the nutritional status and exposure to infections and chemicals. Early life therefore offers windows of vulnerability as well as opportunity for developing the immune system (17)

Moreover, immune system is a complex mosaic of protective mechanisms and the level of protection

is not constant. The strength of immunity depends upon several factors including the genetic composition, nutrition, mental health and environmental factors. Though we cannot do much about the genetics and environmental factors, we can certainly control the nutritional status and mental health with appropriate lifestyle. Harness the Healing Power of Nature with Herbs, Nuts, Seeds and Spice.

BLACKCUMIN AS A NATURAL SUBSTITUTE FOR HYDROXYCHOLOROQUINE

Black Cumin or Kalonji [*Nigella sativa*] is an ayurvedic herb which is top ranked among the herbal medicines due to its antiviral activity apart from antibacterial and antifungal actions and wide range of therapeutic effects. The antiviral actions were possibly due to the increase in number and function of CD T cells and increased production of interferons. Its major bioactive component is thymoquinone, which is chemically related to quinine compounds including the hydroxychloroquine and chloroquine, which are presently being evaluated as the most promising treatment for the COVID-19 (18,19).

GOLDEN MILK [TURMERIC WITH BLACK PEPPER, CINNAMON AND GINGER.

Turmeric [*Curcuma longa*] is hailed in Ayurveda as a miracle herb. The use of turmeric in India dates back to nearly 4000 years to the Vedic culture, where it was used as a culinary spice with medicinal values and religious significance. India produces world's entire turmeric crop and consumes 80% of it. The key bioactive compound in turmeric is curcumin with potent antiviral, antibacterial, anti-inflammatory, antitumor, antioxidant, antiseptic, cardioprotective, hepatoprotective, nephroprotective, radioprotective, and digestive activities (20).

Despite the range of benefits, the bioabsorption and bioavailability of turmeric is limited and need to be enhanced with addition of appropriate food supplements. Golden milk [turmeric milk] is traditionally made with cow's milk, turmeric, black pepper, cinnamon and ginger which increase absorption and availability for maximum health benefits. Turmeric-based herbal teas and decoctions are other efficient ways of consuming turmeric for respiratory benefits. The western world has also now

accepted the benefits of this age-old Indian spice, as a great nutritional supplement.

GILOY (GUDUCHI) FOR BOOSTING RESPIRATORY IMMUNITY

Giloy or Guduchi or Heart-Leaved Moonseed [*Tinospora cordifolia*] is well documented in Ayurvedic literature as a potent herb for boosting the respiratory immunity, which may be consumed as juice, powder or tablet.

TULSI AND ASHWAGANDHA AS POTENT NATURAL 'ADAPTOGENS'.

Adaptogens are herbs which stabilize the physiological processes in the body and promote homeostasis with consequent immune enhancement and general wellbeing. They work at a molecular level and ensure functional balance along the hypothalamic, pituitary, and adrenal axis. Adaptogens boost immunity by supporting and balancing the endocrine system and strengthening the stress response. The immune stimulation of adaptogenic herbs are due to the ability to stimulate a specific white blood cell called a macrophage. Macrophages are white cells which provides first line defense for immune defense against the respiratory pathogens including 2019n-COV.

Tulsi [*Ocimum sanctum*] is called as the 'queen of herbs' in Ayurveda and is surely a herb for all reasons. Tulsi has unique combination of antibacterial, antioxidant, anti-inflammatory and analgesic activities with potential broad spectrum role against the respiratory infections. Moreover, due to potent anti-oxidant action, Tulsi may assist with the body's internal housekeeping and protection of body from toxin-induced damage (21). Ashwagandha or Indian Ginseng [*Withania somnifera*] is an Ayurvedic herb which is useful for wide range of diseases and for general wellbeing mainly as a nervine tonic.

The available scientific data support the conclusion that Ashwagandha is potent regenerative tonic with anti-stress, neuro-protective, antitumor, anti-arthritis, analgesic and anti-inflammatory actions (22). Both Tulsi and Ashwagandha are natural adaptogens and have similar properties and enormous health benefits. They certainly deserve inclusion in this prevention protocol for fighting COVID-19 and appropriate lifestyle modification.

KEY NUTRIENTS FOR RESPIRATORY IMMUNITY

Dietary intake plays an important role in causation and prevention of respiratory diseases. The dietary macronutrients and the micronutrients provide antioxidants which offers protection against the oxidative stress in the mucosa, a characteristic of respiratory diseases. Fruits and vegetables provide benefits due to their nutrient profile consisting of antioxidants, vitamins, minerals, fibre and phytochemicals (23). Few of these nutrients play important role in enhancing the respiratory immunity which is required against COVID-19. A balanced diet should have correct balance of protein, fat and carbohydrate components along with vitamins and minerals. The diet should essentially include the following nutrients from natural sources to meet their daily requirements. Otherwise the dietary supplements should be added. It is always better to rely on nutrients from natural sources due to better absorption and safety.

A. VITAMINS C - Recommended daily dose 65 to 90 milligrams per day. Natural Sources: Indian Gooseberry (Amla), Oranges, Lemon, Bell peppers, Broccoli, Strawberry, Papaya, Kiwi, Pineapples, Guavas, Cabbage / Cauliflower etc.

B. ZINC - Recommended daily dose 8 to 11 milligrams per day. Natural Sources: Red meat, shell fish are rich animal sources. Plant sources include Seeds like hemp, pumpkin and sesame seeds and Nuts like peanuts, cashews and almonds. Other sources include Milk, Cheese, Eggs and whole grains like wheat, quinoa, rice and oats.

C. VITAMIN E - Recommended daily dose 15 milligrams per day. Natural Sources: Vegetable oils [Wheat germ, sunflower, safflower, corn & soybean oils]; Nuts [Almonds, peanuts and hazelnuts] and Seeds [Sunflower seeds] and green leafy vegetables [Spinach and broccoli].

D. PROBIOTICS. Probiotic foods are rich in live bacteria and yeasts that are beneficial for the digestive system and provide boost to the innate immunity. Natural Sources: Yogurt, traditional butter milk, Apple Cider Vinegar, Kefir, Kimchi, etc

E. PROTEINS: Optimal protein intake is vital for normal functioning of immune system. Natural sources: Lentils and Pulses are rich sources of plant

protein. Grains, like oats, wheat, ragi, sorghum (jowar) and pearl millets (bajra), are packed with protein. Quinoa is a widely publicized superfood with high protein contents. Milk and milk products are also good sources of protein. Non-vegetarian foods including eggs and chicken are rich sources of proteins. Spirulina is blue - green algae that come from the sea which is the richest source of protein on this planet.

F. DIETARY ANTIOXIDANTS. Natural antioxidants may be defined as molecules that prevent cell damage against free radicals and are critical for maintaining optimum health. In all living systems, cells require adequate levels of antioxidant defenses in order to avoid the harmful effect of an excessive production of reactive oxygen species and to prevent damage to the immune cells (24).

Fresh fruits and vegetables are great source of essential vitamins, minerals, fibres and antioxidants. Nuts and dry fruits are excellent substitute for daily snacks and are truly 'nature's fast food'. They are packed with minerals, proteins, fibres and vitamins and offers great taste. Cashews, almonds, Walnuts, figs (Anjeer), pistachios, apricots, dates, dry dates (chuhara), raisins (munakka) and peanuts should be included in the routine diet. Seeds are also great source of proteins and major nutrients. Pumpkin seeds, Sunflower seeds and Sesame seeds are great sources of healthy fats, vegetarian protein, fiber, minerals and antioxidant polyphenols. Flax seeds (linseeds) and Chia seeds are a great source of fiber and omega-3 fats with high antioxidants. Regular consumption of green tea and chamomile tea strengthen the immune system, as they are packed with powerful antioxidants unique to each tea.

The Sushruta Samhita, an Ayurvedic text, highlights the beneficial role of ghee for the whole body, which is also an integral ingredient of Indian kitchen. Apart from the impressive digestive functions, ghee boosts the innate immunity due to presence of phenolic antioxidants, which bolster the immune system (25). Ghee is considered a healing food (Rasayana in Ayurveda), which harness the power of mind-body connection in self-healing.

INDIAN SPICES FOR IMMUNE ENHANCEMENT

India is the land of spices with wide varieties of spices available in the markets for routine use in Indian

households. These aromatic spices are integral part of conventional Indian cooking. Apart from providing great taste and color to the food, these spices also offer enormous health benefits including the anti-microbial actions. Black pepper (Kali Mirch), turmeric (haldi), Garlic (Lahsun), Ginger (Adrak), Cumin (Jeera), Black Cumin (Kalonji); Cinnamon (Dalchini), Liquorice (Mulethi), Carrom (Ajwain); Fenugreek (Methi), Asafoetida ((Hing), Cardamom (Elaichi), Cloves (Long), Fennel seed (Saunf) , Bay leaf (Tej Patta) , Nutmeg (Jayaphal) , Curry leaves , Mint (Pudina) and Mustard seed (Sarso) are commonly used in Indian kitchen for routine cooking and are rich in antimicrobial action and immune-boosting properties.

With globalization in last few decades, an increasing number of Indians have adopted the western food trends and ignored the goodness of conventional Indian foods. COVID-19 crisis is the time to redefine these priorities and bring appropriate changes in the dietary and cooking habits for a healthy living. According to Ayurveda, herbs and spices have a multitude of benefits for the mind and body. They can be orally consumed or applied externally or used as aromatherapy. Regular consumption of these household immune enhancing spices can be ensured by using them in day-today cooking. They may also be used for making herbal tea preparations and decoctions. These herbs and spices offer enormous health benefits due to their additive and synergistic impact on the biological functions that protect the human body from the attack of pathogens like corona virus. "It is always better to eat food as medicine, than eating medicine as food".

MODERATION IS THE KEY

As a science of life and the world's oldest medical system, Ayurveda has a holistic approach to health and disease that focuses on preserving and promoting good health and preventing disease through healthy lifestyle practices. It is important to add a word of caution here regarding the use of regular herbs, nuts, seeds and spices. Undoubtedly these gifts of nature offer a wealth of health benefits and should be included in our lifestyle. The practice of overenthusiastic or excessive consumption of these herbs, nuts, seeds and spices mentioned here may lead to adverse impact on the health. Most of the herbs and spices mentioned here are safe and

may not require expert opinion or consultation before use, while few may always require prior consultation. Few herbs may cause allergies to human, while few of them are known to cause excessive functioning of immune response and may cause auto-immune diseases. In case of any adverse symptom, their use should be discontinued. It is better to avoid them during pregnancy. In case of regular use of a particular herb, intervening periods of 'herb vacation' should also be allowed. So, moderation is the key to derive their optimal health benefits.

LIFESTYLE MODIFICATIONS

Surely, the present pandemic of novel corona virus will have significant short term and long-term impact on all walks of life. We do expect a radical change in our perspectives and the key priorities may change in the post-COVID era. The human society is already struggling with the epidemic of non-communicable diseases like diabetes, cancer etc where lifestyle has a major causative role. In the post-COVID era, healthcare systems are likely to realign with greater emphasis on disease prevention and lifestyle medicine and 'Evidence-based Lifestyle Medicine [eLSM]' may acquire a key role.

Lessons from the 1918 Spanish Flu pandemic makes it very clear that the COVID-19 will remain a cause of concern for at least a year or so till the vaccine is invented and distributed across the globe. The 1918 influenza pandemic which killed more than 50 million people and caused more than 500 million infections worldwide, lasted until 1920 with 2-3 peaks across the globe (26). Moreover, corona viruses will still remain in nature with rich reservoirs in bats and rodents and will remain a threat for pandemics in future.

Scientific communities and the government agencies are leaving no stone unturned to control the current COVID-19 pandemic at the earliest and simultaneously develop prevention protocols and treatment strategies for future pandemics. At individual level, we need to understand the importance of 'Lifestyle' in determining the innate immunity. This is the time when society need to act and every individual need to incorporate healthy lifestyle and bring lifestyle modifications, accordingly. "Food is the most abused anxiety drug and Exercise is the most underutilized antidepressant".

A. NUTRITION

Nutrition plays a key role in modulation of the innate immunity, as stated earlier. It is important to adapt to healthy practices to derive maximum benefits from the nutritious food in our diet. It is crucial to follow a specific schedule and circadian pattern for the meals. Lunch should be the main meal of the day to ensure optimal digestion. The adage 'breakfast like a king, lunch like a prince, dine like a pauper', makes lot of sense. Early dinner by 7 PM allows enough time for digestion before the sleep time. The meals should include balanced diet with high nutritive value. Freshly cooked food is always better. Raw fruits and vegetables should be consumed during every meal. Frequent snacking between the meals is not a healthy habit. Intermittent fasting a good practice for detoxication and improve the digestive and metabolic processes, which is inherently related to the strength of the immune response.

Regular consumption of over-processed and stored/canned junk foods including the fast foods has causative association with obesity, diabetes, heart attacks, strokes, dementia, cancer and mental illness. Fried foods in a fast-food restaurant are usually cooked in oil that has been heated repeatedly. Animal products served at fast food restaurants often carry dangerous carcinogens due to grilling and frying at high temperatures (27). The addition of fat, sugar, and salt create a taste that makes people crave these foods. Every addiction has a 'high' during the caloric rush and a 'low' during fasting period and creates a vicious cycle of frequent eating and overeating, which lead to obesity and host of related diseases. The consumption of over-processed and stored food should be minimized to lead a healthy life. Balanced diet with combination of freshly cooked food along with fresh fruits and vegetables is important for optimal functioning of the body processes. Lifestyle modification in terms of dietary contents, meal timings and moderate eating will certainly ensure all round health and strong immune defense.

Cut the CRAP [CRAP is the acronym for the foods, which contain empty calories but also contain ingredients that deprive the body of essential nutrients]: Avoid Carbonated Drinks, Refined Sugar, Artificial Colors & Flavors and over-Processed Food Products

2. HYDRATION

Water is crucial for the survival of every living being on this planet. The average percentage of water in human body will remain above 50 percent for most of the life, though it does decline over time. Ensuring optimal hydration is one of the most basic things you can do for your health. According to Ayurvedic principles, Water consumed before meals acts like a juice, which supports the functions of digestive enzymes. During meals, sips of water acts like nectar to moisturize the food bolus. Water consumed after the meal is considered toxic because it dilutes the digestive enzymes and may douse the 'digestive fire'. Lukewarm water or water at room temperature is considered more appropriate for drinking.

The practice of drinking water which is stored in a copper vessel, preferably overnight used to be a standard practice in Indian households. As per Ayurveda, Copperized water (tamra jal) is a natural antioxidant that helps to balance the three doshas of the body (kapha, vata and pitta). Apart from this, mineralized water kills the the harmful pathogens and renders the water perfectly fit for drinking.

3. EXERCISE

Regular exercise develops muscle strength and posture, reduces body fat, improves digestion and sleep, boosts the immune system and may slow the aging processes. Morning time exercises should be integral part of daily routine. Ayurveda recognizes three pillars of exercise: strength training (like Sun Salutation), flexibility (yoga or stretching exercises) and endurance (running, jogging, cycling, swimming). Brisk walking for at least 30 min is the best form of exercise, which is a refreshing alternative to complicated aerobic routines and overpriced gym memberships.

Brisk walking should be integrated with deep synchronous breathing activity without any interference from the music playing in the ear pieces. It is better to feel and enjoy the beauty of nature through all our senses and undivided attention. The use of complex electronic gadgets to the simple task of walking unnecessary brings complexity to life and should be avoided. 'Mindfulness' will bring more focus and clarity in our lives.

4. YOGA

"Yoga is not about touching your toes. It is what you learn on your way down". Yoga is considered the sister science of Ayurveda and is the art and science of living which integrate Mind, Body and Soul. Yoga and Ayurveda together form a complete approach for optimal health, vitality and higher awareness (28). Yoga is much more than physical exercise and has multiple dimensions including the physical, mental and spiritual aspects. Yogic practices highlight the importance of being an 'early bird' with precise morning schedule and healthy habits. Yoga brings discipline in our actions and thoughts. Yoga requires moderation in life in terms of food, sleep and sexuality, which is the key to a healthy life. Yoga provides a positive purposeful perspective to life and instills a sense of respect for the Mother Nature and its creations. Yoga brings evenness and clarity of mind which is required during the present crisis.

Yoga should be performed daily with combination of stretching exercises and coordinated breathing (Pranayam) along with persistent practice of 'Mindful Meditation'. The ancient wisdom of Ayurveda & Yoga and the timeless teachings of 'Bhagavad Gita' should be integrated in everyday life to lead a happy and healthy life, free from physical or mental diseases (29). This is likely to be the most effective mode of prevention in fight against COVID-19 pandemic.

The ancient wisdom of Ayurveda is often viewed with suspicion by the Modern Medicine, as the Ayurvedic practices have never been examined in a scientific way and are often based on observations and experimentation. The practice of hypothesis testing and establishing cause-effect relationship is not always feasible in Ayurveda because the prevention and treatment protocols are personalized based on the body constitution. Ayurveda-based prevention and treatment protocols for COVID-19 cannot be rejected or ignored for paucity of scientific evidence, if they are backed with basic concepts of science and common sense. Fresh Air and sunlight have helped the humankind during the 1918 Spanish flu and are likely to play preventive role in COVID-19 as well (30). The scientific evidence and validation to substantiate this is neither available nor necessary and should be utilized.

Despite the unique challenges brought about by large population with illiteracy, religious heterogeneity and socio-economic disparities, India's strong and efficient governance ensured prompt measures to fight COVID-19 pandemic. The Indian healthcare is in a unique position to adopt and integrate the best medical practices from the treasure trove of Ayurveda and the clinical excellence of Allopathic Medicine. The stated integrated prevention protocol for COVID-19 is further elaborated in our book (31). The protocol is backed with science and common-sense reasoning and is essentially based on healthy lifestyle choices.

In these testing times, medical leaders and experts should adopt a balanced approach to fight COVID-19 without any biasness towards their field of expertise. The turf battles between different forms of medicine should take a backseat during the present crisis. This is the time to evolve a 'middle path', which integrates the best available options backed with science and common sense. Integrated protocols which combine Modern Medicine and the Ayurvedic practices may provide best protection against COVID-19.

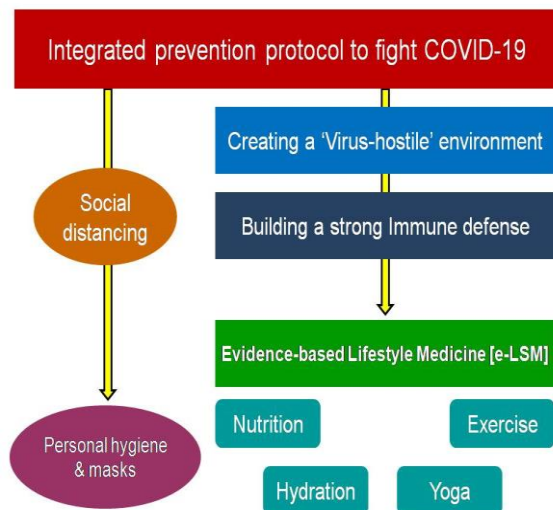


Fig 1: Overall Integrated Protocol: COVID - 19

The age-old Ayurvedic practices can create a non-specific 'virus-hostile' local mucosal environment which should be evaluated as a prevention strategy for COVID-19. Healthy upper respiratory mucosa may provide strong local barrier against 2019-nCoV. The healing powers of Ayurvedic herbs and healthy lifestyle choices can

help to enhance body's innate immunity which can provide strong systemic defense against COVID-19.

COVID-19 will remain a cause of concern for at least next few years. Moreover, due to their reservoirs in bats and rodents, Corona-virus will remain a threat in future as well. This is the time when society need to act and every individual need to incorporate healthy lifestyle based on integrated prevention protocols. Human lifestyles need to move as close to nature, as possible. COVID-19 is indeed a nature's wake-up call and need of the time is to create a fine balance in our lives. "Vitality and Beauty are gifts of NATURE for those, who live according to its laws."

REFERENCES

- <https://timesofindia.indiatimes.com/readersblog/a-breath-of-fresh-air/amidst-pandemonium-of-covid-19-pandemic-the-doctors-dilemma-11892/>
- <https://timesofindia.indiatimes.com/readersblog/a-breath-of-fresh-air/the-doctors-dilemma-during-covid-19-pandemic-solutions-from-bhagavad-gita-12190/>
- <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters>
- <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>
- Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020. *Euro Surveill.* 2020 ;6: 25(5): 2000062.
- D'Amato M, Molino A, Calabrese G, et al. The impact of cold on the respiratory tract and its consequences to respiratory health. *Clin Translational Allergy.* Vol 8, Article no: 20 (2018).
- Mäkinen TM, Juvonen R, Jokelainen J, et al. Cold temperature and low humidity are associated with increased occurrence of respiratory tract infections *Resp Med.* 2009;103(3):456-462.
- Eccles R. An explanation for the seasonality of acute upper respiratory tract viral infections. *Acta Otolaryngol.*2002; 122 (2): 183-191
- Gujrathi AB, Ambulgekar V, Handal A. Effect of steam inhalation on nasal muco-ciliary clearance in normal individuals and nasal disease state. *Int J Contemp Med Res.* 2016;3(5):1262-1264.

10. Saketkhoo K, Januszkiewicz A, Sackner MA. Effects of drinking hot water, cold water, and chicken soup on nasal mucus velocity and nasal airflow resistance. *Chest*. 1978;74(4):408-10.
11. Beule AG. Physiology and pathophysiology of respiratory mucosa of the nose and the paranasal sinuses. *GMS Curr Top Otorhinolaryngol Head Neck Surg*. 2010; 9: 07.
12. Rennie P, Bowtell P, Hull D, et al. Low pH gel intranasal sprays inactivate influenza viruses in vitro and protect ferrets against influenza infection. *Respiratory Research* volume 8, Article number: 38 (2007).
13. D Hull, P Rennie, A Noronha, C Poore, N Harrington, V Fearnley, and D Passàli. Effect of creating a non-specific virus hostile environment in the naso-pharynx on symptoms and duration of common cold. *Acta Otorhinolaryngol Ital*. 2007; 27(2): 73–77.
14. Chopra C, Bhardwaj V, Katna L, et al. Concept of Nasya according to Ayurveda and Modern Medicine. *WJPMR*. 2018;4(9): 148-154
15. Leal J, Smyth HDC, Ghosh D. Physico-chemical properties of mucus and their impact on transmucosal drug delivery. *Int J Pharmaceutics*. 2017;532(1):555-572.
16. Cooper EL, Ma MJ. Understanding nutrition and immunity in disease management. *J Tradit Complement Med*. 2017; 7(4): 386–391.
17. MacGillivray DM, Kollmann TR. The role of environmental factors in modulating immune responses in early life. *Front Immunol*. 2014; 12.
18. Yimer EM, Tuem KB, Karim A, et al. Nigella sativa L. (Black Cumin): A Promising Natural Remedy for Wide Range of Illnesses. *Evidence-Based Complementary and Alternative Medicine / 2019*; 16
19. Ahmad A, Husain A, Mujeeb M, et al. A review on therapeutic potential of Nigella sativa: A miracle herb. *Asian Pac J Trop Biomed*. 2013; 3(5): 337–352.
20. Benzie IFF, Wachtel-Galor S, editors. *Herbal Medicine: Biomolecular and Clinical Aspects*. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Chapter 13. Turmeric, the Golden Spice. From Traditional Medicine to Modern Medicine.
21. Cohen MM. Tulsi - Ocimum sanctum: A herb for all reasons. *J Ayurveda Integr Med*. 2014; 5(4): 251–259.
22. Singh N, Bhalla M, de Jager P, et al. An overview on Ashwagandha: A rasayana (Rejuvenator) of Ayurveda. *Afr J Tradit Complement Altern Med*. 2011; 8(5 Suppl): 208–213.
23. Berthon BS, Wood LG. Nutrition and Respiratory Health—Feature Review. *Nutrients*. 2015; 7(3): 1618–1643.
24. Puertollano MA, Puertollano E, de Cienfuegos GÁ, de Pablo MA. Dietary antioxidants: immunity and host defense. *Curr Top Med Chem*. 2011;11(14):1752-66.
25. <https://www.yogajournal.com/lifestyle/ghee-better-than-butter>
26. Martini ML, Gazzaniga NL, Barberis I. The Spanish Influenza Pandemic: a lesson from history 100 years after 1918 *J Prev Med Hyg*. 2019; 60(1): E64–E67.
27. Fuhrman J. The Hidden Dangers of Fast and Processed Food. *Am J Lifestyle Med*. 2017;12 (5).
28. David Frawley. Textbook – “Yoga & Ayurveda: Self Haling and Self-Realization.” 2009 [Lotus Press, Wisconsin].
29. Lasater J. Textbook – “Living Your Yoga - Finding the spiritual in everyday life”. 2000. [Rodmell Press, California].
30. Hobday R. Coronavirus and the Sun: a Lesson from the 1918 Influenza Pandemic. <https://medium.com/@ra.hobday/coronavirus-and-the-sun-a-lesson-from-the-1918-influenza-pandemic-509151dc8065>
31. https://www.amazon.in/Self-Care-during-COVID-19-beyond-Lifestyle-ebook/dp/B08DPRND3K/ref=tmm_kin_swatch_0?_encoding=UTF8&qid=&sr=

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