

Revisiting Indian traditional practices and assessing their role in development of immunity towards COVID-19

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ABSTRACT

People's lifestyles changed dramatically as a result of the COVID-19 outbreak. The significance of hygiene was brought to the forefront, and people began to become more aware of specific hygiene practices. Hand sanitation, social distancing, isolation, and measures to enhance immunity were all recommended as preventive strategies. The importance of having a healthy immune system also came to the forefront. Traditional practices followed by people all over the world may serve as a guide to living a healthy lifestyle and provide numerous protective aspects in the transmission of infections. Apart from these routines, traditional eating habits that include the usage of diverse herbs and spices in our daily life have been shown to have components that increase immunity. This review will look at several Indian traditional practices to see if there is a scientific basis for them and if there is a link between them and the development of immunity in humans. The change in modern practices and eating habits from the traditional ways will also be compared and conclusions on how the changed lifestyle has led to a decrease in immunity in individuals will be made.



Keywords: Traditional and Cultural Practices, Hygiene, Immunity, Eating Habits, COVID-19

INTRODUCTION

COVID-19, a highly contagious viral illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has wreaked havoc on the world's demographic trends, resulting in the death of more than 5.8 million people globally, making it the deadliest global health catastrophe ever since the 1918 influenza pandemic. SARS-CoV-2 quickly spread over the world

after the first cases were discovered in late December 2019 in Wuhan, Hubei Province, China, causing the World Health Organization (WHO) to declare it a worldwide pandemic on March 11, 2020.¹⁻³

COVID-19 has ravaged several countries and overburdened many healthcare systems since it was declared a global pandemic. Long-term lockdowns imposed during the pandemic have led to the loss of livelihoods, which has had a rippling effect on the global economy.^{4,5} Despite significant progress in clinical research leading to a better knowledge of SARS-CoV-2⁶⁻⁸ and COVID-19 management, restricting the spread of the virus and its variants has been a growing worry as SARS-CoV-2 continues to wreak havoc around the world.⁹ The emergence of new SARS-CoV-2 variants threaten to undo the tremendous achievements made so far in controlling the spread of COVID-19, despite the exceptional pace with which vaccines against COVID-19 have been developed along with robust global mass immunization efforts.¹⁰⁻¹²

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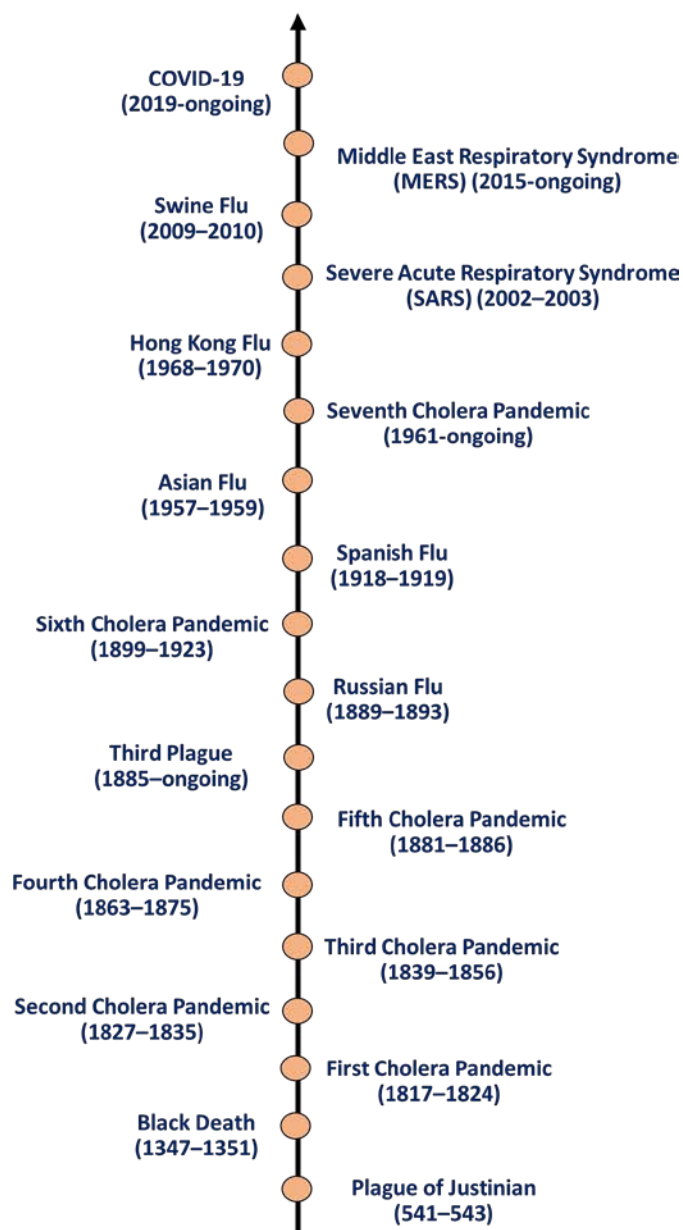


Figure 1. A Timeline of Pandemics.¹³

Throughout history, infectious diseases with pandemic potential have emerged and spread on a regular basis. Humanity has already been ravaged by major pandemics and epidemics such as plague, cholera, flu, severe acute respiratory syndrome coronavirus (SARS-CoV), and Middle East respiratory syndrome coronavirus (MERS-CoV).¹⁴ The world is currently dealing with the COVID-19 pandemic, which does not appear to be nearing its end. Furthermore, the time of the next pandemic's emergence and the pathogen that will trigger it is also unknown.¹³

Given the situation, in this time of uncertainty, to protect ourselves from any possible infection we need to go back to the old saying of "prevention is better than cure" and adopt certain changes in our lifestyles. The modern lifestyle that involves too much stress and unhealthy eating habits also affects our health

and makes us prone to infections like COVID-19.^{15,16} We need to build our immunity and follow preventive measures such as social distancing, hand hygiene, isolation, etc., to protect ourselves from diseases like COVID-19.^{17,18}

Turns out that preventive and protective measures have long been an integral component of our traditional social and cultural practices. It is time to look back at these traditional practices and re-adopt practices that are not only practical but are also beneficial for us in boosting our immunity and protecting us from diseases. In this article, an attempt has been made to enlist some Indian traditional and cultural practices while correlating them with scientific evidence and logic. Certain modern lifestyle habits have also been analyzed for their possible impacts on decreased immunity.

BEHAVIORAL AND CULTURAL PRACTICES

HYGIENE PRACTICES

Hand hygiene is the single most important, easiest, and least expensive way to stop infectious agents from spreading,¹⁹. To prevent the spread of infection, traditional Indian customs strongly advocate hand washing practices before a variety of daily activities, such as eating a meal or returning home from outside. To prevent the spread of infection among the members of the family or outsiders, a bath is recommended every day, after a trip outdoors, vomiting, a visit to the barber, cremation ground, or a house where a death has occurred.²⁰ Mud and charcoal were employed as cleansing agents before soap was widely utilized in India. Studies have shown the effectiveness of using mud in reducing hand contamination.²¹

In India, shoes are removed and hands and legs are thoroughly cleansed before entering the house. This is an important hygiene habit in Asian culture that prevents the spread of infections within homes.²² Also, traditionally, clothes for indoors and outdoors were kept separate, and when a person comes back home, after an outdoor visit, they were expected to bathe and change their clothes. This would prevent disease transmission. During the COVID-19 pandemic also, it was suggested that people should change and wash their clothes after going outside to prevent transmission of COVID-19.²³

Once or twice a year, during the festival seasons in India, it is customary to clean the entire home thoroughly followed by the whitewashing of walls. This would not only remove dust, fungus, and insects from the house but also sanitize it.²⁴

It is a well-known fact that many viruses, including the SARS-CoV-2, are destroyed by exposure to sunlight.²⁵ In India, it is conventional to dry one's clothes in the sun. UV radiation from the sun is the primary germicide in the environment. UV radiation destroys viruses by altering their genetic material, DNA and RNA, chemically. The most efficient inactivation wavelength, 260 nm, is in the UVC range.²⁶ As a result, drying clothes and garments in the sun acts as a second layer of protection against bacteria and viruses after washing, preventing the spread of infectious agents that may be present on the cloth surface.²⁷

FOOD PRACTICES

The addition of a blend of spices in everyday food, such as turmeric, ginger, cinnamon, clove, cinnamon, and others, has been shown to strengthen our immune system. Spices not only enhance the aroma, flavor, and color of food and beverages but can also protect from a wide range of acute and chronic diseases,²⁸. Spices and medicinal plants from India are well-known around the world. Both of them have a diverse set of physiological and pharmacological characteristics.²⁹⁻³¹

Turmeric (*Curcuma longa*), has long been an important ingredient in Indian cuisine. It has cancer-preventive, antibacterial, hepatoprotective, cardioprotective, and anti-inflammatory properties. It also functions as an antioxidant.^{29,32,33} Turmeric is utilized in practically all Indian recipes as a flavoring agent. Turmeric latte, also known as “*haldi ka doodh*” is a part of the staple Indian diet. Traditionally Indians drink one glass of turmeric milk every day, especially when ill. Curcumin from Turmeric has also been tested as a possible treatment option for COVID-19 and it has been seen that it effectively neutralizes SARS-CoV-2 in vitro.³⁴

Cinnamon (*Cinnamomum verum*), has long been a prevalent ingredient in traditional Indian, Chinese, Unani, and Persian medicine. For thousands of years, cinnamon has been utilized as a popular spice in various countries around the world.^{35,36} Antiviral, anti-diabetic, antioxidant, and anti-cancerous activities of cinnamon have been demonstrated.³⁷ Cinnamon's potential in limiting overshooting immune reactions in COVID-19 patients has also been studied.³⁸

Coriander (*Coriandrum sativum*) is one of the most widely used spices in the world, and its medicinal properties have been known since antiquity. A wide range of pharmacological activities have been attributed to different parts of this herb due to the presence of a multitude of bioactives, including anti-microbial, anti-oxidant, anti-diabetic, anxiolytic, anti-epileptic, anti-depressant, anti-mutagenic, anti-inflammatory, anti-dyslipidemic, anti-hypertensive, neuroprotective, and diuretic.³⁹ Linalool, the main molecule contained in seeds, is known for its ability to modulate numerous important disease pathogenesis pathways.⁴⁰ It is also rich in iron, Vitamin A, Vitamin C, and phosphorus, all of which help to prevent macular degeneration.⁴¹

Garlic (*Allium sativum*) and ginger (*Zingiber officinale*) offer a wide range of medicinal properties. Many diverse cultures have recognized the potential use of garlic for disease prevention and treatment throughout history.⁴² Garlic has been shown to have antimicrobial, cardioprotective, cancer-preventive, hepatoprotective, anti-inflammatory, and neuroprotective properties.⁴³ Garlic and its active organosulfur compounds (OSCs) have been shown in preclinical and clinical studies to help with a variety of viral infections.⁴⁴ Garlic has been shown to reduce the rate of viral infection induced by SARS-CoV-2. This activity is thought to be caused by the presence of organosulfur (e.g., allicin) and flavonoid (e.g., quercetin) components in garlic aqueous extracts and essential oils.⁴⁵ Ginger has also been established to show, antioxidant, anti-inflammatory, anticarcinogenic, and antimicrobial effects.⁴⁶ Fresh ginger has

Table 1: Therapeutic effects of some commonly used spices and herbs

Spices and Herbs	Therapeutic Effects	Ref
Turmeric (<i>Curcuma longa</i>)	Cancer-preventive, antibacterial, hepatoprotective, cardioprotective, and anti-inflammatory	29, 32, 33
Cinnamon (<i>Cinnamomum verum</i>)	Antiviral, anti-diabetic, antioxidant, and anti-cancerous	37
Coriander (<i>Coriandrum sativum</i>)	Anti-microbial, anti-oxidant, anti-diabetic, anxiolytic, anti-epileptic, anti-depressant, anti-mutagenic, anti-inflammatory, anti-dyslipidemic, anti-hypertensive, neuroprotective, and diuretic	39
Garlic (<i>Allium sativum</i>)	Antimicrobial, cardioprotective, cancer-preventive, hepatoprotective, anti-inflammatory, and neuroprotective	43
Ginger (<i>Zingiber officinale</i>)	Antioxidant, anti-inflammatory, anticarcinogenic, and antimicrobial	46
Cumin (<i>Cuminum cyminum</i>)	Immune stimulatory, nephroprotective, gastroprotective, antioxidant antidiabetic, antimicrobial hepatoprotective, and neuroprotective	49, 50, 51
Tulsi (<i>Ocimum tenuiflorum</i>)	Antimicrobial, mosquito repellent, anticoagulant, antiallergic, antitussive, antihypertensive, anti-asthmatic, antidiarrheal, and antipyretic	55
Spearmint (<i>Mentha spicata</i>)	antibacterial, antifungal, antioxidant, hepatoprotective, antidiabetic, cytotoxic, anti-inflammatory, larvicidal activity	57, 58
Asafoetida (<i>Ferula assafoetida</i>)	relaxant, neuroprotective, memory-enhancing, digestive enzyme, antioxidant, antispasmodic, hypotensive, hepatoprotective, antimicrobial, anticarcinogenic, anticancer, anticytotoxicity, antiobesity, anthelmintic, and antagonistic	60
Clove (<i>Syzygium aromaticum</i>)	Antioxidant, antibacterial, antifungal, antiviral, and anticarcinogenic	59

antiviral properties against the human respiratory syncytial virus (HRSV) and rhinovirus, indicating that it can be used to treat respiratory viral infections.⁴⁷ Ginger's ability to fight COVID-19 has also been investigated. 6-gingerol has a high binding affinity for a variety of virus proteins that are required for SARS-CoV-2 replication, according to molecular docking investigations.⁴⁸ Spices including mustard, allium, and ginger have been shown to be antimutagenic, detoxifiers, and DNA damage preventers in vitro.⁴¹

Cumin (*Cuminum cyminum*) seeds, both whole, and ground, have been widely employed in numerous cuisines of many diverse food cultures from ancient times. Cumin seeds have been utilized as a traditional ingredient in a variety of Indian recipes for thousands of years. Cumin seeds have a lot of therapeutic benefits in the Indian Ayurvedic system, especially for digestive problems.⁴⁹ Black cumin (*Nigella sativa*) is also frequently used as a flavoring agent in Indian dishes. Cumin seeds have high levels of antioxidants in their essential oils. Immune stimulatory, nephroprotective, gastroprotective, antidiabetic, antimicrobial hepatoprotective and neuroprotective properties have been established in both *Cuminum cyminum* and *Nigella sativa*.⁴⁹⁻⁵¹ *Nigella sativa* has also been tested as a plausible treatment option against COVID-19. It was seen that on treatment with *Nigella sativa*, faster recovery from COVID-19 symptoms with a lower rate of hospitalization was observed.⁵²

Tulsi (*Ocimum tenuiflorum*), often known as "The Queen of Herbs," has a broad range of health benefits and is commonly consumed by Indians in the form of tea. Its health benefits include antimicrobial, mosquito repellent, anticoagulant, antiallergic, antitussive, antihypertensive, anti-asthmatic, antidiarrheal, and antipyretic effects among many others.^{53,54} Tulsi is frequently used to treat asthma, diarrhea, cough, arthritis, eye diseases, anxiety, indigestion, vomiting, hiccups, gastric, cardiac, and genitourinary disorders, fever, dysentery, back pain, skin diseases, ringworm, and malaria, among other conditions.⁵⁵ Eugenol, a component of Tulsi, has been proven to inhibit the interaction between the Spike S1 of SARS-CoV-2 and ACE2 inducing a therapeutic response.⁵⁶

Spearmint or Pudina (*Mentha spicata*), Clove (*Syzygium aromaticum*), and Asafoetida (*Ferula asafoetida*) are also commonly used as flavoring agents in Indian dishes. *M. spicata* has been displayed a varied range of biological effects including antibacterial, antifungal, antioxidant, hepatoprotective, antidiabetic, cytotoxic, anti-inflammatory, larvicidal activity, antigenotoxic potential, and antiandrogenic activities.^{57,58} Reports have confirmed the antibacterial, antifungal, antiviral, and anticarcinogenic properties of clove. It is also a potent antioxidant and antimicrobial agent.⁵⁹ Asafoetida has shown many therapeutic activities including relaxant, neuroprotective, memory-enhancing, digestive enzyme, antioxidant, antispasmodic, hypotensive, hepatoprotective, antimicrobial, anticarcinogenic, anticancer, anticytotoxicity, anti-obesity, anthelmintic, and antagonistic effect.⁶⁰ The therapeutical potential of Clove against COVID-19 has also been studied.⁶¹

Mustard and sesame seed oils, which are high in vitamin E, are used in Indian traditional cookery. Vitamin E, from these oils,

influences T cell activity directly by affecting membrane integrity, signal transduction pathways, and cell division, as well as indirectly by influencing inflammatory mediators produced by other immune cells, and therefore mediates immunological function.⁶² Mustard oil also displays a wide range of therapeutic properties, including anti-cancer and anti-inflammatory properties.⁶³

Fasting has also long been an integral component of our traditional eating habits. The flexibility of our traditions, allows people to fast according to their faith and capacity, with fasting durations ranging from once or twice a week to weekly fasts or monthly fasting on specified days. Fasting has been shown in studies to offer cardioprotective, neuroprotective, and metabolic advantages, as well as encouraging weight loss and boosting insulin sensitivity.⁶⁴⁻⁶⁶ Short-term fasting may improve chemotherapeutic response while also boosting the resistance of normal cells to the damaging effects of chemotherapy.⁶⁷

Traditionally, food is cooked in iron cooking pots. This is a simple and cost-effective strategy to increase iron levels in the body and cure iron deficiency anemia.^{68,69} Water was often stored in earthen pots or copper pots. Storing water in earthen pots will not only keep it cool but will also enrich the water with minerals from the mud.⁷⁰ Storing water in copper pots will enrich the water with copper and also it has been proven to effectively kill diarrhoeagenic bacteria present in the water preventing infection.⁷¹

Raw food is traditionally avoided and only completely cooked food is consumed. Cooking ensures that any infectious agent present in the food is not passed on to the consumer, but raw or uncooked food has a higher risk of being contaminated with live infectious agents. During the COVID-19 pandemic also, it was advised that only thoroughly cooked food should be consumed and that consumption of raw food should be avoided.⁷²⁻⁷⁵

YOGA

Yoga has been an important part of Indian culture for centuries. It provides a holistic approach to health. Regular Yoga practice, when done correctly, boosts the body's strength, stamina, agility, and flexibility. Its beneficial effects on numerous organ systems have been thoroughly researched.^{76,77} Pranayama, by raising vital and timed vital capacity, maximum expiratory pressure, maximal voluntary ventilation, and breath-holding time, improves pulmonary function.^{78,79}

Stress is frequently linked to an increase in autonomic, cardiovascular, and immune system dysfunction. The ability to handle stress in a proactive manner in everyday life may reduce the endocrine system's continual activity, increasing the immune system's efficacy.⁸⁰ Yoga has a considerable impact in reducing stress-induced autonomic, endocrine, and psychological alterations.⁸¹ Yoga causes the posterior or sympathetic portion of the hypothalamus to be inhibited, which improves the body's sympathetic reactions to stressful stimuli and restores stress-related autonomic regulating reflex systems. The parasympathetic system's activity may rise or remain unchanged.⁸² It affects the hypothalamus and anterior pituitary

systems via the cerebro-cortico-limbic pathways. Yoga has also been shown to boost the amounts of cytokines in the blood, implying that it has a favorable influence on the immune system.⁸³

Suryanamaskar is a sequence of yoga postures performed under the sun, in synchrony with the breath.⁸⁴ Vitamin D has a wide range of effects on immune system cells. The discovery of VDR expression in almost all immune cells, as well as the occurrence of metabolizing hormones in immune cells, demonstrated that vitamin D plays a role in the regulation of both adaptive and innate immune responses.⁸⁵ Suryanamaskar performed in the sun exposes the body to solar rays from the sun, allowing the body to spontaneously synthesize Vitamin D, which is important for immune system modulation.⁸⁶ Suryanamaskar also improves the immune system's effectiveness.⁸⁷ Vitamin D's involvement in preventing COVID-19 infection has been established, and its insufficiency has been linked to a poor prognosis and increased severity in COVID-19 patients.^{88,89}

OTHER CULTURAL PRACTICES

Poor ventilation has been shown to contribute to the spread of airborne diseases like TB and SARS. Proper ventilation prevents the build-up of viral contamination.^{90,91} Traditional Indian dwellings were designed with numerous windows, high ceilings, and sometimes even open ceilings to allow for optimal cross ventilation and the elimination of exhaled airborne bio-aerosols, hence preventing cross infections.^{92,93} Sunlight aids in the production of Vitamin D boosting resistance to infections and is also involved in surface decontamination.⁹⁴ The traditional clothing in India like *sarees* and *dhotis* have open ends giving room for proper ventilation and hence preventing sweat buildup which can lead to the growth of infectious fungal and bacterial agents.^{95,96}

In the ancient times, it was believed that food should not be reheated and eaten, but now that refrigerators exist, food is heated numerous times, stored, and consumed for several days. Reheating food several times might alter its nutritional content and also give rise to the formation of harmful compounds,^{97,98} consuming fresh food ensures that nutrients are received in their active form.

Certain post-death rituals also point to strategies to prevent infection spread. In Hinduism, if a family member dies, the family is not allowed to cook in their homes for two days, and everyone who may have come into contact with the corpse is required to bathe immediately.⁹⁹ Also, the individual who is cremating the body is not permitted to leave the house for ten days; these ceremonies assist to isolate the family, and bathing ensures that if the person died of an illness, it will not spread to other people. This is analogous to the current 'quarantine' strategy in place to prevent the spread of COVID-19.¹⁰⁰

In the wake of the global pandemic of COVID-19, the traditional salutation gesture of folding one's hands together with a small bow of the head, "Namaste," has been recognized as the most polite, safest, humble, and hygienic way of welcome.¹⁰¹ This is a type of greeting that does not require physical contact

and yet conveys a sense of respect and consideration for the other person while also preventing disease transmission. This is comparable to the social distancing norms implemented during the COVID-19 pandemic. From this, we can see that our ancestors have been following social distancing for a very long time.¹⁰²

In certain Indian cultures, babies would be made to drink a few drops of boiled and cooled water in which they were bathed in, this could have exposed them to small amounts of infectious agents which could act as inoculums allowing their bodies to make antibodies against them and be better prepared when exposed to the actual infection.

Our elders have always insisted on speaking softly at all times. The reasoning behind this was that when a person speaks loudly, aerosol emission increases, contributing to the spread of respiratory infections through the air.^{103,104} Even some phonetic features of spoken language can have an impact on the number of aerosol particles created and released, contributing to the spread of airborne infections.⁵³

Taking oil baths and sitting in the sun is also a practice that was performed regularly by people in India. Newborns are also given oil massages. It has been proven that oil baths and massaging enhance the epithelial barrier of the skin, increases blood circulation, and calms the mind.^{105,106} Sitting in the sun will give the body an opportunity for Vitamin D synthesis.¹⁰⁷

Another important practice is gargling with warm saline water, which is a fantastic and scientifically proven way to relieve sore throat symptoms. It is particularly effective at preventing the spread of upper respiratory tract infection and promoting early recovery.¹⁰⁸ Steam inhalation has long been known as a cure-all for a runny nose, a common cold, and nasal obstruction, and it has now been demonstrated to be effective in the prevention of viral infections.¹⁰⁹ Hot water consumption is regarded as a panacea for viral fever. Ingestion of hot water elevates body temperature, boosting the body's natural defenses against microbial invasion. All of these have long been emphasized in Indian traditional practices.¹¹⁰

CONCLUSION

These days we are slowly leaving our traditional practices and adopting new ones which may not be so beneficial for us. For example, in olden times due to lack of mechanical transportation and other technological advancements, people had to walk more and do more physical activity to do their daily chores keeping them fit, but nowadays most things have become automatic which has led to a drastic reduction in physical activity by people, leading to a sedentary lifestyle.¹¹¹ Too much cleanliness in today's world has also restricted people from getting exposed to mild disease forms which could have provided them immunity, hence when the actual disease is encountered the effects are much more pronounced.¹¹² Unhealthy eating habits and increased consumption of junk foods nowadays are contributing to a decrease in the nutritional demands of the body being met and an increase in the prevalence of obesity and diabetes which further increases the risk of other associated diseases.^{113,114} It has been proved that consumption of RO (reverse osmosis) water, which

is now the most common way of water purification, has detrimental effects on health. Purifying water using RO eliminates all the essential minerals such as sodium, calcium, chloride, potassium ions present in it, which are important for many important cellular processes. This may lead to mineral deficiencies in the consumer.^{115,116} People also are now more restricted to indoors and they don't go out much, which limits sun-exposure and hence Vitamin D production, which plays major roles in the immune system functioning.⁸⁶ All these could be contributing to a decreased immune function in people in the present conditions. Many of our traditional practices definitely have scientific logic behind them. Such practices should be revisited and re-adopted so that people are benefitted from them and can get the best out of them. The best way forward is by learning from the past, adopting and adapting them according to the present-day scenario such that we can obtain the most out of them.

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