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Review Article

COVID 19 Virus-Genomic and Molecular Gaming and the Role of Diet Preparations in Therapy

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Abstract

COVID19 virus, which carries genes from unrelated phylogenetic origin (such as human bat and avian) is a causative agent of severe acute respiratory syndrome. It primarily targets the respiratory system, but can cause extrapulmonary manifestations that can lead to severe complications and death both with and without these complications. The use of vaccines, immunotherapy, and steroids is not considerably effective against COVID 19 virus driven manifestations because COVID 19 virus uses an unusual strategy to cause illness by targeting cells in different tissues of human body systems presenting as a syndrome.

COVID 19 virus pandemic resulted in 20 million deaths worldwide. The use of diet preparations designed by using novel scientific findings, as reported by Rab (2007), eradicated COVID 19 virus pandemic in Pakistan and several other global regions, saving countless lives.

In this paper knowledge built on reported work by Rab (2007) is used to demonstrate the unusual strategy that COVID 19 virus uses to cause illness manifestations. In addition the scientific narratives have been presented in support with suggested molecular mechanisms, indicating that use of appropriate food preparations is an effective therapy for COVID 19 virus driven illness. This is evidenced from the fact that Rab's designed diet preparations helped to eradicating COVID19 virus pandemic in Pakistan and many other parts of globe. In addition to the details previously mentioned, this paper reports several food preparations that can enhance digestion and absorption of healing food contents. These diet preparations utilize a novel strategy to prevent COVID 19 virus driven complications, combat premature aging, accelerate natural healing and ultimately help recovering patients regain their natural health.

Keywords: *Molecular Mechanism Underlying COVID 19 Driven Illness; Epigenetics; Evolution; Food; Genes Regulatory Networks; Natural Health*

Background

COVID 19 virus pandemic is the only pandemic in which food played a critical role in its eradication. To understand the molecular mechanisms driving COVID 19 virus driven illness, a brief detail on COVID 19 virus driven illness and the therapeutic role of food is provided below.

Severe acute respiratory syndrome

COVID-19 virus with unrelated phylogenetic lineages displaying unusual illness features

COVID 19 virus has genes from unrelated phylogenic origins such as from avian, human, bat. It is the causative pathogen for severe acute respiratory syndrome. It emerged from Wuhan, China, in December 2019 and by March 2020, it was declared a pandemic. COVID 19 virus pandemic had badly affected the medical profession, medical therapies, research, business and daily living leading an adverse influence on mental well-being and natural health across the globe. COVID 19 virus spreads through respiratory droplets. The average incubation period is 6.4 days, followed by a highly variable range of symptoms, varying from individual to individual, influenced by environmental factors, that typically include fever, cough, dyspnea, myalgia or fatigue. The majority of patients experience a mild illness whereas several others develop severe hypoxia with or without a wide range of complications that requires hospitalization and mechanical ventilation [1-4]. So far available antiviral agents, immunomodulatory therapies with steroids, various cytokine blockers and vaccines have not been found to be supportive unlike what has been reported [5-9]. The COVID 19 virus vaccines can induce severe complications [10,11].

COVID19 virus receptors, target tissues and pathology

Angiotensin-converting enzyme2 (ACE2), the entry receptor for the causative COVID19 virus, is expressed in multiple extrapulmonary tissues allowing the virus to damage tissues following the viral infection. It also includes endothelial cells damage and thromboinflammation, dysregulation of immune responses, and maladaptation of angiotensin-converting enzyme 2 (ACE2)-related pathways [12].

For this reason, although COVID 19 virus primarily targets the respiratory system, it can cause several extrapulmonary manifestations. In addition to thrombotic complications, dysfunction of multiple organs and body systems such as myocardial dysfunction, arrhythmia, acute coronary syndromes, acute kidney injury, gastrointestinal symptoms, hepatocellular injury, hyperglycemia, ketosis, neurologic illnesses, ocular symptoms, and dermatologic impairment can occur alongside unusual complications [13-25].

The COVID 19 virus illness driven structural pathologies which are found in platelets and erythrocytes, alongside spontaneously formed amyloid microclots, may be directly linked to vascular changes progression, that includes thrombotic microangiopathy, diffused intravascular coagulation, and large-vessel thrombosis, as well as ground-glass lung opacities. This clinical picture of COVID 19 virus strongly suggests that the virus driven illness is also a vascular disease, presenting as a syndrome that causes premature aging in many targeted clusters of cells [26].

Indigestion and neurological involvement-the two most common COVID 19-virus-driven extrapulmonary manifestations

The manifestations of COVID19 virus are widely variable and range from asymptomatic infection to multi-organ failure and death, depending upon the innate immune response, which is the first line of defense in the body. Pregnant women do not appear to be at a higher risk of catching COVID 19 virus infection nor are they at a higher risk of complications caused by COVID 19 virus. There is no evidence that the COVID19 virus can be transferred to a child during pregnancy or at the time of birth, confirming the connection of COVID 19 virus driven illness with the aging process, which accelerates in the later part of life [27].

The most common COVID19 virus driven extrapulmonary manifestations include indigestion, neurological involvement with or without psychiatric impairment. Myocarditis is another clinical feature revealed during COVID 19 virus driven infection [27,28].

Does the presence of mitochondria-like structures in COVID 19 virus infected patients' blood explain unusual COVID 19 virus driven illness features?

The presence of mitochondria-like structures containing mitochondrial deoxyribonucleic acid (DNA) in the blood has been reported in recent years, which could contribute to the distinct characteristics of illnesses experienced by COVID 19 virus infected patients [29-32].

Collectively, mitochondrial structural dynamics are critical to the organelle's role in both bioenergetics and crucial cell-wide signaling events. This directly impacts the survival, death or evolution of cells toward well-adopted cell phenotypes, which explains one of the underlying factors responsible for the unusual features of COVID 19 virus driven illness [33-35].

Oxidative stress flux shifts serve as a triggering driver for COVID 19 virus driven multifaceted adversities

Reported literature confirms that oxidative stress is a common driver triggering adversities in different organs by virus-induced oxidative flux shifts and modulating inflammation, immune dysregulation and autoimmunity. This process causes diffuse endothelial cells damage that affects macro-and microvascular systems, leading to micro-thrombosis with thyroid dysfunction [25,36-41]. Published literature shows that COVID 19 virus infected patients exhibit significantly higher systemic oxidative stress than healthy individuals [39]. The level of oxidative flux shifts induced by COVID19 virus infection depends on environmental factors [4]. Clearance of hemoglobin outside the cells in plasma, and its associated repairing and regeneration pathways are shut down upon the triggering of oxidative stress flux shifts in COVID19 virus driven infection [42].

COVID 19 virus also targets genes regulating integral components of the plasma membrane, including carrier proteins

COVID 19 virus targets the genes regulating integral components of plasma membranes, which are involved in cations transmembrane transport, ion channel activity, nicotine addiction modulation, copper transport, cardiac cells calcium regulation and neuronal pathways, associated with neural functionality (such as intellectual disability and cerebellar ataxia) and the aging process [41,43-50].

Physiological characterization of COVID 17 virus driven manifestations triggered by multifaceted molecular-level genomic gaming

In physiological terms, COVID 19 virus driven illness is categorized as an endothelial disease. In this condition oxidative stress disturbances disrupt homeostasis leading to regulatory and functional shifts. These shifts manifest as coordinated disruptions in interconnected cellular and systemic processes including haemostasis, fibrinolysis, vasomotion, inflammation, vascular permeability and structural integrity. Consequently, many of host' defense mechanisms pathways transform into destructive mechanisms pathways against host itself. These defense mechanisms of the host are tightly integrated, relying on homeostasis maintained from the cellular level up to body's systemic level [51,52].

At molecular level, the COVID 19 virus drives illness manifestation by switching aerobic biogenesis to anaerobiosis. This shift occurs because the virus epigenetically disrupts metallic and energy homeostasis, which cumulatively triggers a scattered shift in pH. These disruptions cause genetically programmed and/or unprogrammed cells death. In parallel, well-adopted cell phenotypes evolve, which may or may not experience premature aging. Oxidative stress shifts act as primary common stimuli driving these biological, biochemical and genetic events. This mechanism is mediated by the *SOD1* (*SOD1* gene encodes Cu-Zn superoxide dismutase-1 (sod1p) a major cytoplasmic antioxidant enzyme that catalyzes the dismutation of superoxide radicals to molecular oxygen (O_2) and hydrogen peroxide (H_2O_2)) gene network which alters stereochemistry-driven roles of Cu-Zn superoxide dismutase (sod1p) regarding copper (Cu^{2+}) ions and other charged chemical species.

The stereochemistry of chemical species and their roles change under enhanced oxidative stress, particularly in response of systematic oxidative stress shift. This alteration is a key driver for a wide range of COVID 19 virus driven infection related manifestations with varying intensities among patients.

The underlying interplay of key drivers triggers these common medical conditions by altering the regulation of *CTR1*, (*CTR1* gene encodes high affinity copper transporter protein 1 (ctr1p)) *SOD1* (*SOD1* gene encodes Cu-Zn superoxide dismutase-1 (sod1p)), glutathione (GSH) encoding genes and cellular cholesterol biosynthesis genes, all of which are interdependently co-regulated at transcriptional level to sustain metallic and energy homeostasis, thereby regulating cell aging and driving cell evolution or cell death [41,44-56].

The entry of COVID19 virus into target cells triggers a burst of oxidative fluxes that drives the inflammation response and releases a systemic cytokines storm across multiple organs. This event interwines the immune system with body's systemic response, leading to genetically programmed and/or unprogrammed cell death, necrosis or evolution of well-adapted cell phenotypes with or without undergoing premature aging.

Combined with premature aging, these mechanisms drive multifaceted pathogenesis pathways induced by COVID 19 viral infection.

Dysfunction in molecular pathways that drive metallic ions and energy homeostasis leads to generation of charged chemical species and energy imbalances. These can act as triggering factors underlying diffuse alveolar damage with interstitial thickening, leading to compromised gas exchange. Hypoxia is observed in the COVID 19 virus infected patients, appearing as distinct but varying phenotypes.

The outcome is reduced mitochondrial respiration, which causes abnormal metal distribution including manganese (Mn), copper (Cu) and zinc (Zn) [57-61]. Furthermore, it provokes an inflammatory response and a burst of cytokines that drive endothelial cells dysfunction.

A scarcity of copper supply as an outcome of dysfunctional cell membranes leads to hyperferritinemia, disrupting mitochondrial homeostasis and shifting mitochondrial respiration from an aerobic to an anaerobic state. This anaerobic respiration facilitates reduction of pyruvate into lactate, catalyzed by lactate dehydrogenase (LDH), a marker reported to be highly up-regulated in COVID19 virus driven illness [59,61-64].

These reactive oxygen species (ROS)-induced mitochondrial impairments facilitate iron-dependent ferroptosis (a genetically programmed non-apoptotic cell death) leading to tissue damage and eventually to organ failure [65-68].

Manganese superoxide dismutase (sod2p) (an enzyme which is found in mitochondria that converts superoxide to the less reactive hydrogen peroxide (H_2O_2), which can freely diffuse across the mitochondrial membrane) is critical for entering the genetically programmed glucose growth phase under aerobic condition, and initiating apoptosis by altering cell energy dynamics and affecting cell's energy-redox balance. Conversely, intermembrane space Cu-Zn superoxide dismutase (sod1p) is critical for buffering mitochondrial integrity which is a frequent target of oxidative stress. Heat shock proteins (Hsps) such as heat shock protein 70 (Hsp70), is overexpressed in the targeted cells of COVID 19 virus infected patients' tissues. Under hypoxia condition with copper scarcity, this overexpression exacerbates energy crisis due to heat shock protein 70 (Hsp70)'s functional dependency on adenosine triphosphate (ATP), which ultimately exhausts host cells' adenosine triphosphate (ATP) pool. Consequently, heat shock proteins' (Hsp) functionality halts. This is partly due to altered stereochemistry and shifting energy states that alter roles of precursors and target molecules. For example, heat shock protein 70 (Hsp70) fails to facilitate the processing and mitochondrial relocation of manganese superoxide dismutase (sod2p) preventing it from acquiring its functional enzymatic activity [44,45]. Mitochondrial integrity is lost when COVID 19 virus driven metallic ion supply responsible for modulating *SOD1* driven genes' network in diseased patients' cells undergoes restriction. This restriction stems from differential energy generation statuses coupled with scattered bursting oxidative fluxes that can alternately switch genes' networks affecting the cellular cholesterol biosynthesis by disturbing metallic ions homeostasis. Because copper (Cu)and iron (Fe) levels mutually regulate physiological equilibrium, glutathione (GSH1) encoding genes' activities are necessary to maintain copper (Cu) level and load copper (Cu) to Cu-Zn superoxide dismutase (sod1p). Cu-Zn superoxide dismutase (sod1p) can affect life span and fate of cells by virtue of shifts in its stereochemistry between holo-Cu-Zn superoxide dismutase (holo-sod1p), such as (Cu^{2+}) loaded molecular form possessing enzyme activity and apo-Cu-Zn superoxide dismutase (apo-sod1p), such as (Cu^{2+}) deficient molecular form, lacking enzyme activity.

Consequently, this process delays genetically programmed cells' death and fosters the evolution of well- **adapted** cell phenotypes; many of them experience premature aging, which is revealed by the appearance of amyloid protein structure such as micro-clots [23,69-79].

Charged chemical species modulate COVID19 virus driven illness adversities

Iron (Fe) ions are one of the key factors modulating the adversity of COVID19 virus driven COVID 19 driven illness. Sustained copper (Cu) supply helps the body fight COVID 19 virus driven illness but its effect is nullified by excessive intake of zinc (Zn) which inhibits copper (Cu) absorption [43,61,80-103].

The release of oxidation flux bursts destabilizes plasma membranes, altering permeability and creating pores based on the intensity and type of charged chemical species. In certain cases, these species destroy membrane structures and alter genes regulatory operation networks' paradime by damaging transport systems for oxygen radicals and metallic ions including copper (Cu); because these transport systems depend on the content and stereochemistry of cholesterol molecules present in cell membranes. These cellular events ultimately confer altered roles to chemical species, particularly charged ones, under non-physiological conditions. Under hypoxia conditions, particularly with enhanced oxidative stress and a limited copper (Cu) supply, Cu-Zn superoxide dismutase loses its dismutase activity and gains peroxidase activity, further intensifying COVID 19 virus driven adversities [41,44-56,104,105].

Reasons for COVID19 virus infection driven dysbiosis and its associated consequences

Under the proposed model, COVID 19 virus infection associated-dysbiosis likely occurs due to shifts in oxidative stress and pH alongside with increased competition for sequestering electrolytes, including metallic ions. These factors alter the normal flora and gut physiology, often increasing intestinal movement. Consequently, this triggers indigestion and neuropsychiatric manifestations, which are two of the most common features of COVID 19 virus driven illness [37,106-112].

The presence of free mitochondria outside the cell in COVID19 virus infected patients helps regain Cu-Zn superoxide dismutase (sod1p) and manganese superoxide dismutase (sod2p) activity. This occurs when there is an ample supply of metallic ions, particularly copper (Cu) ions, which help to regain redox homeostasis, that in turn, facilitates iron (Fe) ions reloading at their active sites while stabilizing gradient equilibrium balance-between ferrous and ferric ions. This regained gradient equilibrium balance between ferrous and ferric ions gradually restores energy homeostasis and delays the premature aging process. Here is where the role of diet comes in.

Post-COVID syndrome or long COVID and its underlying mechanism

The continuation of a variety of heterogeneous symptoms lasting beyond the standard phase of COVID 19 virus driven illness is categorized as post-COVID syndrome (PCS). PCS is mainly characterized by musculoskeletal, pulmonary, digestive and neurological involvement, including depression.

Long COVID may occur due to long-term organ damage, likely resulting from a diminished repair or regeneration process. This diminished repair or regeneration process appears to be triggered by specific pathological events following the initial illness, which in turn could contribute to the later expression of a wide range of symptoms. The affected organs influence systemic function of body by triggering oxidative stress shifts alongside specific, long-lasting inflammatory and autoimmune pathways; these drive cellular and systemic events in Long COVID 19 patients in a heterogeneous manner, appearing as diverse symptoms with varying intensity and levels of COVID-19 virus driven illness severity for which bodies of infected individuals are differently prepared to respond. Diet plays a significant role in modulating course of COVID 19 virus driven illness, preventing COVID 19 virus driven illness and other diseases [108,113-119].

Nutritional interventions as a therapeutic strategy for COVID19 virus driven illness

In simple words, Cu-Zn superoxide dismutase (sod1p) and metallic ions derived from food or other dietary sources can be absorbed into blood and enter cells. This supporting finding was reported by Culotta and associates [120-123].

Literature reports that the *SOD1* gene, which encodes for Cu-Zn superoxide dismutase (sod1p) and the *CTR1* gene which encodes for copper transporter 1 protein (ctr1p) are part of same gene regulatory network. These genes, lying in the same gene regulatory network, undergo reciprocal regulation in response to copper (Cu) concentration gradient levels dependent manner modulated by iron (Fe)-copper (Cu) associated and dissociated ionic equilibrium balance gradient shifts modulating the oxidative stress shifts via transcriptional feedback mechanism. This concept demonstrates that physical, chemical and biochemical stimuli or biological events can alter the effects of mutations that impair the function of essential genes operating within the same regulatory network. This process can enhance the activity of weaker genes (low expressing genes). When biochemical reaction cascades function under stress conditions, their framework alters. Rab (2007) revealed that, under stress conditions, the operational regulation of gene networks' pathways and ongoing biochemical reactions modifies their functional, chemical and biochemical potentials, targets and consequences. For example, under stress conditions, yeast cells with del *CTR1* gene (that encodes for copper transporter 1 protein (ctr1p)) can regain wild type levels of viability when copper (Cu) ions are sufficiently supplied to Cu-Zn superoxide dismutase (sod1p) by the *Lys 7/CCS* gene's product. This recovery occurs by *Lys 7/CCS* gene's product even though *Lys 7/CCS* is typically down-regulated or inactive in non-functional or in absence of *CTR1* gene that encodes for copper transporter 1 protein (ctr1p). This restoration of activity of the *SOD1* gene (that encodes for Cu-Zn superoxide dismutase (sod1p)'s product, a protein that binds copper (Cu) and zinc (Zn) ions in its molecular structure, and destroys free superoxide radicals including those generated by electron transport chain (respiratory chain) in absence of *CTR1* gene, which encodes for copper transporter 1 protein (ctr1p), a cell membrane protein that is a high affinity membrane copper transporter; such as Cu-Zn superoxide dismutase (sod1p) molecules acquiring their multifaceted chemical and biochemical potentials involving stereochemistry and enzymatic activity with their shifts between dismutase and peroxidase activity enabling the knockout yeast cell populations to regain the survival strength against the stressor in a manner similar to that observed in wild-type yeast strains.

These findings question the credibility of traditional understanding of the relation among protein dysfunction, cell survival and disease. It also underscores the complexity of genomic operations and biochemical processes, which may be governed by genetically and/or epigenetically preprogrammed biochemical cascades alone or modulated in combination with environmental and dietary drivers. These drivers act upon universal evolutionary capacitor switch, such as *SOD1* gene encodes for Cu-Zn superoxide dismutase (sod1p) - Cu-Zn superoxide dismutase (sod1p) (*SOD1*-sod1p) switch driving regulatory circuit through universal evolutionary switch complex such as *SOD1* gene encodes for Cu-Zn superoxide dismutase (sod1p)-Cu-Zn superoxide dismutase (sod1p) (*SOD1*-sod1p) switch complex acted upon by modulators in parallel which drive evolution of the healthy or unhealthy poorly-adopted or well-adopted cell phenotypes influencing the trajectory of disease and recovery. These findings confirm the presence of universal evolutionary capacitor switch, such as *SOD1* gene encodes for Cu-Zn superoxide dismutase (sod1p)-Cu-Zn superoxide dismutase (sod1p) (*SOD1*-sod1p) switch driving regulatory circuit through universal evolutionary switch complex such as *SOD1* gene encodes for Cu-Zn superoxide dismutase (sod1p) - Cu-Zn superoxide dismutase (sod1p) (*SOD1*-sod1p) switch complex playing multifaceted roles, which includes deciding cells' fate, their evolution and regeneration potentials, sensing and transmitting triggered consequences of homeostasis shifts driving stimuli across the cells, modulated by the fluctuation in functional genes operational networks altering the impact of genes' mutations including deletions while modulating the metabolic cascades in genetically and/or epigenetically preprogrammed and unprogrammed driven manner.

SOD1 gene, which encodes for Cu-Zn superoxide dismutase (sod1p), a major cytoplasmic antioxidant enzyme that catalyzes the dismutation of superoxide radicals to molecular oxygen and hydrogen peroxide and the *CTR1* gene which encodes for copper transporter 1 protein (ctr1p) that acts as a high affinity membrane copper transporter, are part of same gene regulatory network, undergo reciprocal regulation in response to copper (Cu) concentration gradient levels dependent manner modulated by iron (Fe)-copper (Cu) associated and dissociated ionic equilibrium balance gradient shifts modulating the oxidative stress shifts via transcriptional feedback mechanism. Genes involved in glutathione (GSH) biosynthesis lie upstream of pathways that reciprocally regulate intracellular biosynthesized

cholesterol and vitamin D biosynthesis in the presence of sunlight, which in turn modulate respiration modes, energy demands, cell aging and cell fate in genetically and/or epigenetically preprogrammed manners and also in genetically or epigenetically unprogrammed manners in response to unusual stimuli sensed as altering oxidative stress flux release, driving shifts in energy demand varying from cell to cell over time such as fluctuating oxidative stress seen in case of COVID 19 virus driven illness manifestations and in various neurodegenerative diseases whereas scarcity of free molecular oxygen (O_2) and copper (Cu) ions sustainable supply are the key drivers to modulate the course of illnesses, by affecting the immune functions, regulating the responses against the driving stimuli such as oxidative stress and free iron (Fe)- catalyzed manifestations, augmented by presence of nonphysiological hemoglobin [32,44-50,73,97,124-143].

COVID 19 virus driven illness manifestations present a syndrome whose course is governed by multiple virulence factors. These virulence factors interfere with biological including genetical pathways at various levels causing a diverse and varying illness manifestations' severity in different patients. For multiple reasons, including fluctuating oxidative stress distorting cellular homeostasis across the physiological systems with altered and varying nutritional requirements, drugs, vaccines steroids administration and immunotherapy have been found ineffective in curing COVID19 virus driven illness manifestations [144].

Food is known for its prophylactic and therapeutic role since ages [145-156]. A few diet preparations have been proven to cure COVID 19 virus driven infection without causing complications, minimizing death rates and eradicating COVID19 virus driven illness in Pakistan and other regions of globe; meanwhile, COVID19 virus pandemic has caused over 20 million deaths. Other diet preparations played a significant role in preventing consumers from expressing COVID19 virus driven illness symptoms while decreasing the risk of malnutrition [148,151-156]. The role of antioxidants in reducing COVID 19 virus driven illness incidences has already been established [19,20,75,76,110,157-171]. Food has various modes of action which affect the course of illnesses, including COVID19 virus driven illness. As already known, food provides nutrition, bioactive molecular species, beneficial microorganisms, energy and a huge range of chemical and biochemical species which cannot be obtained from non-biological sources, including those which cannot be synthesized or are unstable outside living systems. The food processing governs digestibility and absorption potential of food ingredients. Furthermore, the absorbed bioactive food components from biologically originated natural ingredients can alter natural roles of molecular species in living systems, including human bodies [147,152]. For instance, beta-methylamino-L-alanine (BMAA) which is known chelator of copper (Cu), zinc (Zn), nickel (Ni) ions etc. can also pass brain-blood barrier; it occurs in nature in a bound form within the family of hybrid non-ribosomal peptide-polyketide secondary metabolite called paenilamicins. These peptides are produced by the honey bee intestinal pathogen *Paenibacillus larvae* by a hybrid nonribosomal peptide/polyketide synthase (NRPS/PKS) [172-174]. Upon entering in blood through food, it crosses the blood-brain barrier. In brain, it interferes with ability of neosynthesized melanin to trap heavy metals, making it more sensitive to 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) degradation.

The binding of beta-methylamino-L-alanine (BMAA) to neosynthesized melanin could lead to an alteration of the melanin polymer, thereby making it less effective for trapping heavy metals or more sensitive to 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) degradation [175-177]. The auto-oxidation process of catecholamines is considered to be a major source of neuromelanin. The substrate involved in this oxidative polymerization is either norepinephrine in the locus coeruleus or dopamine in most other brain areas. Dopamine is an essential neurotransmitter that is involved in striatal control [178-182]. Melanogenesis (neuromelanin synthesis) is a neuroprotective mechanism that prevents the accumulation of dopamine-oxidation products like cyclized quinones (DA *o*-quinone, aminochrome and 5,6-indolequinone). Beta-methylamino-L-alanine (BMAA) can disrupt this pathway. Furthermore, beta-methylamino-L-alanine (BMAA) can facilitate the generation of excess metabolites from catecholamines catabolism while disrupting iron distribution [183]. These metabolites participate in oxidation processes that induce mitochondrial dysfunction, free-radical accumulation, lipid peroxidation, abnormal protein degradation, alteration and aggregation of α-synuclein into neurotoxic oligomers. Consequently, this leads to an early neuronal aging common to several neurodegenerative pathologies [184-188]. The disbalance in iron distribution can trigger a shift in *SOD1* gene regulatory network's operation, switching the cell's fate from apoptosis to accelerated apoptosis, unprogrammed cells death, or evolution of well-adapted cells phenotypes with or without premature aging.

The molecular mechanism narrated above demonstrates a simple example of how consuming bioactive molecules can alter the innately functions of various molecules participating in human physiological pathways. Under specific conditions, this alteration can shift healthy physiology into pathological events. Consequently, utilizing food as an agent for adjuvant therapy offers a novel approach to advancing our current knowledge [147].

It has already been established that ginger fortified honey mixture and chicken nutrifortified broth, when administrated appropriately, can cure COVID19 virus illness manifestation without causing everlasting complications [148,152,154-156]. Dextrin present in honey helps to improve the absorption of the minerals including copper (Cu), zinc (Zn), magnesium (Mg) present in it. As previously mentioned [189], this enhanced absorption helps to restore Cu-Zn superoxide dismutase (sod1p) and manganese superoxide dismutase (sod2p) activity by providing an ample supply of metallic ions. Specifically, delivering copper (Cu) ions to free extracellular mitochondria in COVID 19 virus infected patients enables cells to regain redox homeostasis. This, in turn, helps restore iron to its specific active sites while stabilizing gradient equilibrium balance between ferrous (Fe^{+2}) and ferric (Fe^{+3}) ions. This mechanism highlights the critical role of diet in patient recovery [29,106].

Dietary fructose (primarily from fruits and honey) and/or endogenously produced fructose (via the polyol pathway) shifts cellular metabolism focused on aerobic breakdown of glucose towards breakdown of fructose under a limited oxygen supply, generating lactate, fatty acids and glucose. The first two can be used to provide energy, whereas glucose can be converted into glycogen. By shifting the energy production burden from the mitochondria to glycolysis, fructose reduces oxygen (O_2) demand to aid survival under low-oxygen (O_2) situations. This metabolic shift helps COVID 19 virus infected patients to deal with an energy crisis, besides protecting them from mitochondria-driven adversities [190-192].

D-Mannose which is not naturally found in blossom honey but occurs in honeydew honeys depending on their botanical and geographical origin, acts as a V-ATPase inhibitor to suppress the generation of inflammatory cytokines; when combined with ginger (a source of anti-inflammatory agents), regular consumption of this fortified honey mixture offers a novel approach to combating COVID 19 virus driven manifestations in COVID 19 virus infected patients and achieving a natural cure [193-196].

Beta-methylamino-L-alanine (BMAA) present in honey, which is a known chelator of copper (Cu), zinc (Zn) and nickel (Ni), helps restore metallic ions and energy homeostasis upon consumption, thereby preventing COVID 19 virus driven complications [172-174].

Honey contains a wide range of microorganisms and bioactive chemical and biochemical species, with offering the potential to preserve them in a protected format until they are delivered to the target tissues [194-197].

Kosher or halal, grass-fed chicken (slaughtered by cutting the artery in chicken's neck to bleed until the body's blood is completely removed) with skin is used to prepare chicken nutrifortified broth. Blood is a rich source of hemoglobin and iron; together, they have an enhanced potential to be absorbed in human gut and enter in blood where they can intensify the adversities of COVID 19 virus infection [106,144,198-201].

As previously discussed, the eradication of COVID19 virus pandemic in Pakistan and globally confirms that certain food combinations have prophylactic and therapeutic roles. Dietary interventions not only shield individuals from general illness but also provide protection against COVID 19 virus driven illness manifestations as well as facilitate recovery while reducing long-term complications and mortality rates.

This understanding of knowledge raises questions regarding the findings of Schlessinger., *et al.* (2011), which indicate a mutual relation among protein defects, cells survival and disease [202].

Digestion and absorption

The digestion and absorption of food, one hand, depend on its type, its physicochemical nature, ~~its~~ composition, structural architecture and processing, alongside on its microbial flora and their cumulative activities. On the other hand, the function of human digestive system, the body's microbial flora, in addition to an individual's genome profile and life history including dietary habits play a critical role in modulating personal digestion and absorption potentials.

Diet preparations that augment digestion and absorption

The following are a few diet preparations which augment the repairing and recovery process in COVID 19 virus infected patients, while also protecting them from premature aging and various other complications.

Constipation or diarrhea with or without mouth inflammation

To augment the roles of epigenetically driven biological events such as those involving *SOD1*, genes encoding GSH and *CTR1* coupled by genes regulating cellular cholesterol biogenesis through their directly and indirectly dependent metabolic batteries co-regulated epigenetically in parallel through their products driven or product dependent feedback mechanism and metallic ions homeostasis status involved in modulating the innate repairing processes facilitating recovery, the presence of specific digestible form of bioactive molecules and beneficial microorganisms are required in diet. For the same reason, constipation or diarrhea, the consequences of indigestion further distort homeostasis and cause intestinal microbial imbalances. These consequences of COVID 19 virus infection must be managed to prevent worsening COVID 19 virus driven manifestations and associated complications. In most of the cases, these complications are the outcome of inappropriate therapy.

As previously mentioned, the administration of a ginger fortified honey mixture and chicken nutrifortified broth helped eradicate the COVID 19 virus pandemic globally. Consequently, World Health Organization (WHO) declared the end of COVID 19 global health emergency on 4th May 2023 [148,152,154-156].

Oily sweet milk preparation for constipation

To resolve constipation, take 250 ml of fresh, pasteurized, or Ultra-High-Temperature-treated (UHT) milk and heat it to 50°C (a temperature tolerable to the touch). Add 25 ml of corn oil and ½ tea spoon brown sugar to the lukewarm milk, then mix well to prepare oily sweet milk preparation. Ask the patient to take 2-3 sips 3-4 times a day until the issue is resolved. In cases of severe, uncontrolled diabetes, serve 4-5 sips of oily milk preparation without added brown sugar to the patient, 2-3 times daily until the constipation resolves.

This preparation provides nutrients, important metallic ions, microorganisms, secondary metabolites with buffering potential. All of these are suspended within an emulsion, augmenting their absorption and normalizing human digestive physiology. These therapeutic features are missing in medicated laxative preparations.

Give small slices of fresh tomatoes (*Solanum lycopersicum)*, unpeeled cucumber (*Cucumis sativus*), carrot (*Daucus carota subsp. sativus*) and beets (*Beta vulgaris*). If the patient is too lethargic to chew the vegetable slices, blend them into a suspension. This can be given to all the recovering COVID19 virus infected patients who do not have diarrhea. Additionally, bananas (*Musa acuminata, Musa balbisiana*), grape (*Vitis vinifera*) paste (prepared by mashing deseeded grapes (*Vitis vinifera*) in a blender for 2-3 minutes at 1-2 minutes intervals), and mashed potatoes (*Solanum tuberosum*) can be given to all recovering COVID 19 virus infected patients.

Biologically tailored yogurt and sweet basil seeds preparation: For patients with diarrhea, mouth inflammation, both or neither

Take 150 ml of fermented yogurt, preferably prepared without removing cream, as described by Rab (2018) [148] or sold by an internationally validated organic brand. Add 100 ml of potable water or boiled water, as described by Rab (2019) [149]. Finally, blend

the mixture for 2-3 minutes in a glass jar blender, or beat it for 3-5 minutes in glass vessel. Take out the contents and place them in a wide-mouth glass vessel. Add ¾ teaspoon of sweet basil seeds (*Ocimum basilicum*), stir well with a wooden spoon, and leave at room temperature for 6-8 hours. Give biologically tailored yogurt and sweet basil seeds preparation 2-3 times a day to recovering COVID 19 virus infected patients. This applies whether they have diarrhea, mouth inflammation, both or neither symptoms.

Biologically tailored yogurt and sweet basil seeds preparation acts as an emulsion with multifaceted characteristic features. It provides chemical and biochemical entities that serve as functional carrier molecules, in addition to contributing in other roles, provides nutrients and secondary metabolites while augmenting their adsorption process in a biologically sustainable form. This process boosts body repair mechanisms and hinders premature aging, particularly in COVID 19 virus targeted cells, by intercepting biological events at epigenetic level in parallel [203-205].

Multiple food preparations for nausea coriander mint and garlic paste

Take 100g each of fresh coriander leaves (*Coriandrum sativum*) and fresh mint leaves (*Mentha piperita*) and wash them with potable water. Take 2-3 cloves of garlic (*Allium sativum*) and peel them. Take 3 pinches of cumin, (*Cuminum cyminum*) ¼ teaspoon of salt, 2-3 pinches of dried ginger (*Zingiber officinale*) powder and 9 pinches of brown sugar. Grind all the ingredients, preferably using a wooden or stone mortar and pestle or in a glass jar grinder. Soak 9-12 tamarind seeds (*Tamarindus Indica*) with pulp in 20 - 50 ml of potable water for 30 minutes. Remove the seeds and place tamarind pulp in a small airtight glass jar. Pour coriander mint and garlic paste in the glass jar containing tamarind pulp, mix the contents well to form coriander mint and garlic sauce. Refrigerate the sauce until use. Mix ¼ teaspoon of coriander mint and garlic sauce with 75 ml of naturally fermented yogurt. Serve 3-5 tablespoons of this diet preparation to the recovering COVID 19 virus infected patients 3-5 times daily.

Mashed potatoes mixed with coriander mint and garlic sauce

When the patient can tolerate semi-solid food, mashed potatoes (*Solanum tuberosum*) (the recipe is given elsewhere) mixed with coriander mint and garlic sauce can be given 2-3 times a day to the patient.

To prepare mashed potatoes, boil 5-10 potatoes (*Solanum tuberosum*) until they become tender. Peel them and crush them to make semi-solid paste. Add 1 teaspoon of salt, ½ teaspoon of black pepper (*Piper nigrum*) and ½ - 1 tablespoon of olive oil and mix well.

Mashed potatoes mixed with coriander mint and garlic sauce and mushroom paste

Once COVID 19 virus infected patient begins tolerating mashed potatoes mixed with coriander mint garlic sauce, add mushroom paste (mushroom mix, recipe provided below) to mashed potatoes mixed with coriander mint and garlic sauce and serve this diet preparation to the recovering patient once to twice a day [206].

To prepare mushroom paste, grind 5 - 10 mushroom (*Agaricus bisporus*) (either brine-tinned or mushrooms boiled in brine) using a wooden or glass mortar and pestle. Pour the paste into an airtight glass bottle and store it in the freezer.

To prepare boiled mushrooms in brine, place 10 - 12 mushrooms in a pan and add enough potable water to submerge them completely. Add 1-2 teaspoons of salt, mix well and heat the pan. Allow the water to boil on a low flame until mushrooms become soft. Drain the brine and store the mushrooms in an airtight glass bottle under frozen conditions until use.

The food systems described earlier constitute different culinary categories. For example, coriander mint and garlic sauce mixed with yogurt forms a nutritious, emulsion-based-multifaceted appetizer. Mashed potatoes are categorized as a simple semi-solid nutritious food. In contrast, mashed potatoes mixed with mushroom paste are considered a complex semi-solid nutritious food. When mixed with

multifaceted appetizer like coriander mint and garlic sauce, this combination exhibits a blend with digestion-boosting properties within a rich nutritious background. In addition to providing essential metallic ions, other micronutrients, secondary metabolites and prebiotics, it delivers naturally originated biological functional carrier molecules and other natural bioactive molecules capable of making instantly absorbable complexes. Furthermore, these preparations boost the secretions like gastric juice, adjust pH and relax muscles and nerves. Ultimately, the use of these food preparations provides a novel strategy to deal with the causes triggering nausea in recovering COVID 19 virus infected patients [207].

Sweet tamarind sauce

Sweet tamarind (*Tamarindus Indica*) sauce preparation is another diet preparation that can be paired with nutritious foods to relieve nausea. Take ¾ cup of tamarind pulp with seeds in a glass vessel and soak it in potable water for half an hour. Remove the seeds to prepare tamarind paste. In a steel pan, add 100 ml of potable water, ½-2 tablespoons of brown sugar, 3-5 fenugreek (*Trigonella foenum-graecum*) ground seeds after freshly grinding in a mortar and pestle, 2-3 pinches of dried ginger *(Zingiber officinale)*, ¼ teaspoon of roasted cumin and chilli mix (recipe provided elsewhere). Heat the brown sugar spicy mix for 7-10 minutes over low heat. Transfer tamarind paste and heat until it reaches the desirable consistency. Transfer the paste to an airtight glass vessel and store under refrigerated conditions until use [208-211].

Sweet tamarind sauce mixed with a yogurt and potatoes base

To prepare the roasted cumin and chili mix, place 2-3 teaspoons of cumin (*Cuminum cyminum*) and 1 red dried round chilli (*Capsicum annuum*) (capsicum species) onto a preheated roti pan such as a wok or tawa (a large round, slightly concave frying pan used in South Asia for preparing roti and other flatbreads). Stir the mixture continuously with a wooden spoon over low heat until the spices turn brown and start releasing a strong aroma. Finally, grind the mixture into a fine powder and store the cumin and chili mix powder in an airtight glass container at room temperature.

Take 250 ml of fermented, full-cream yogurt prepared according to Rab (2018) [148], or use an internationally validated organic yogurt brand free from preservatives. Add 100 ml of potable water or boiled water, as described by Rab (2019) [149]. Next, add 1/4 teaspoon of roasted cumin and chilli powder, 1-2 teaspoons of sweet tamarind sauce and 5 pinches of black pepper. Finally, blend the yogurt mix for 2-3 minutes. Add ¾ to 1 cup of small, cubed boiled potatoes to the yogurt mix and stir well with a wooden spoon. Leave it at room temperature for 2-3 hours. Serve this diet preparation 2-3 times a day as a small meal to a patient recovering from COVID19 virus infection. The sweet tamarind sauce mixed into the yogurt and potatoes base can be stored for up to 48 hours in the refrigerator.

Salty sweet and sour sweet potatoes with or without sweet tamarind sauce

As an alternative, boil 5-7 sweet potatoes (*Ipomoea batatas*) until soft. Peel them and cut them into small pieces. Add ¼-¾ teaspoon of salt and fresh lemon juice, and mix well. Leave the mixture for 2-3 hours at room temperature. Serve these salty sweet and sour sweet potatoes, with or without sweet tamarind sauce to a recovering COVID 19 virus infected patient 1-2 times a day [212].

Sweet tamarind sauce mixed with a yogurt and potatoes base constitutes a suspension-based food system with a strong buffering potential. Furthermore, it provides an excellent source of prebiotics, secondary metabolites, metallic ions. It also delivers biologically originated chemical and biochemical functional carrier entities including complexes-forming entities that are readily absorbed into the bloodstream. Many of these chemical and biochemical species can cross the blood-brain barrier to nourish the body and perform other vital functions.

Sweet tamarind sauce mixed with a yogurt and potatoes base plays a significant role in attaining homeostasis, boosting defense mechanisms, and repairing physiology of gut and microenvironment. Furthermore, it enriches the gut with prebiotics, making it resistant to pathogens and preventing them from accessing target cells and enabling this mixture to act as an oral vaccine.

Salty sweet and sour sweet potatoes, with or without sweet tamarind sauce, form a fortified, semisolid-food system. This system provides a rich source of energy, secondary metabolites and other essential nutrients. They include the minerals that can be easily digested and absorbed into the bloodstream in presence of chemical and biochemical functional carrier entities, helping to relax muscles and nerves by reducing inflammation triggered by oxidative stress shifts.

Tomato garlic and onion mix

To prepare the tomato garlic and onion mix, take 5 ripe tomatoes (*Solanum lycopersicum*) freeze them [213], and then thaw them. Peel the tomatoes and add the peeled tomatoes with their juice/drip to 3 garlic cloves, 2-3 pinches of dried ginger powder, 2-3 fenugreek seeds powder (after freshly grinding in a mortar pestle), ¼ teaspoonful cumin powder (after freshly grinding in a mortar pestle), 1/4 cup of spring onion (*Allium fistulosum* bulb only), and 75-100 ml of water in a glass jar grinder. Grind the mixture to form a fine paste. Pour the tomato garlic and onion paste into a steel pan, add ¾ to 1 teaspoon of salt, 1-2 teaspoons of brown sugar and 3-5 tablespoons of naturally fermented vinegar. Heat over a low flame until the consistency thickens into a tomato garlic and onion sauce paste. Pour the paste in airtight glass bottle and store it in the refrigerator. Tomato garlic and onion mix can be stored for two weeks in the refrigerator and for six months in the freezer.

A tomato garlic and onion mix with different blends

Post COVID 19 virus infected patient can consume a tomato garlic and onion sauce mixed with a coriander mint and garlic sauce. This can be served over mashed potatoes mixed with mushroom paste or without mushroom paste 2-3 times a day as a snack.

This tomato garlic and onion sauce provides an additional source of secondary metabolites and essential metallic ions. Besides acting as a strong appetite stimulant, it boosts gastric secretions and relieves nerve and muscle tension. Furthermore, freezing tomatoes induces a stress response in the tomatoes, that enhances the release of stress-combating chemical and biochemical entities. Upon consumption, these entities support repair systems in recovering COVID 19 virus infected patients while hindering the premature aging process in virus targeted cells [214-217].

Sour salted dried ginger pickled in lemon juice

Pickled in lemon juice, sour salted dried ginger is helpful for relieving nausea especially in a patient recovering from COVID 19 virus infection [152].

Drinks beneficial for recovering COVID 19 virus infected patients

Herbal milk tea infusion

To prepare an herbal milk tea infusion, take 1½ cup of potable water, add 1-inch-long cinnamon, (*Cinnamomum zeylanicum*) (dalchini) after breaking into small pieces. Add 1-2 true cardamom pods (*Elettaria cardamomum*) after opening their shells, 1-2 pinches of dried ginger, ½ - 1 teaspoon of brown sugar and 3-5 fresh mint leaves (*Mentha piperita*). Heat the herbal mix on a low flame until its volume reduces by half. Next, add 1 cup of milk either 1-2 tea bags or 1 - 1½ teaspoons of tea dust. Continue heating on a low flame for 25-35 minutes. Strain the infusion and serve 2-3 sip of sieved herbal milk tea infusion to the recovering COVID 19 virus infected patient at least twice a day.

As a food system rich in secondary metabolites, an herbal milk tea infusion acts as a modified emulsion with anti-inflammatory potential. It relaxes muscles and nerves while providing stress-relieving prebiotics and bioactive chemical and biochemical entities to nourish the body.

Fortified salty and sweetish strawberry drink

To prepare a fortified strawberry diet preparation, freeze ¾ cup of strawberries (*Fragaria × ananassa*) [213]. Add ½ teaspoon of salt and 1-1½ teaspoons of brown sugar to the frozen strawberries. Mix the salt and brown sugar with the frozen strawberries using a wooden spoon and allow them to thaw naturally at room temperature. Next, blend the strawberry salt and sugar mix for 4-5 minutes in a glass jar blender, using intermittent intervals of 1-2 minutes. Let the blended strawberry salt and sugar pulp sit at room temperature for 4-5 hours.

Pour the strawberry salt and sugar pulp into an airtight glass container, add 750 ml of potable water and 1-1½ teaspoons of sweet basil seeds (*Ocimum basilicum*), and mix well with a wooden spoon. Store the strawberry salt sugar and basil seeds mix at room temperature for 3-4 hours to allow fortified salty and sweetish strawberry drink to form. Finally, pour fortified salty and sweetish strawberry drink into an airtight glass jar and refrigerate it until use. The fortified salty and sweetish strawberry drink can be stored in the refrigerator for up to 2 days or in a frozen state up to six months.

Serve the fortified salty and sweetish strawberry drink to the recovering COVID 19 virus infected patient 2-3 times a day. To resolve sleeping disorders, particularly in recovering COVID19 virus infected patients, mix the fortified salty and sweetish strawberry drink with fresh lemon juice of 1-2 lemons *(Citrus×limon)* and serve it 2 - 2½ hours before bedtime.

The fortified salty and sweetish strawberry drink is a suspension containing suspended fibre and small seeds that generate friction while passing through gut. This process removes damaged cells and microorganisms, making the gut microenvironment better adapted for augmented digestion and absorption while relaxing muscle and nerves. Furthermore, the fortified salty and sweetish strawberry drink carries a wide range of bioactive molecules including functional carrier molecules for sequestering metallic ions and other chemical and biochemical species. These cumulatively play a key role in regaining homeostasis and boosting repairing mechanisms, thereby hindering the premature aging process in targeted cells, particularly in the COVID virus driven infection recovering patients [218-221].

Fortified sweet apricot drink with or without fresh lemon juice

To prepare a fortified sweet apricot drink, wrap 7-9 washed apricots (*Prunus armeniaca*) in jute fabric for 3-4 days until the fruits are fully ripe. This process utilizes trapped ethylene to accelerate ripening, generate stress metabolites, and activate the release of stress-combating gene products like glutathione (GSH) and Cu-Zn superoxide dismutase (sod1p). Additionally, it promotes the leaching of nutrients, pigments and other bioactive compounds [213,222-226].

Cut ripe, unpeeled apricots (*Prunus armeniaca*) into small pieces with a knife and place them in a glass jar. Add 1-2 teaspoons of brown sugar and mix the ingredients with a wooden spoon. Let the apricot pieces and brown sugar mix sit at room temperature for 30 minutes. Next, blend the apricot pieces and brown sugar mix for 1-2 minutes using intermittent intervals of 1-2 minutes. Pour the apricot and brown sugar mix into an airtight glass vessel and leave it at room temperature for 3-4 hours. After sitting, blend apricot and brown sugar mix again for 4-5 minutes, pausing for 1-2 minutes at intermittent intervals. Add 750 ml of chilled potable water and 1-1½ teaspoons of sweet basil seeds (*Ocimum basilicum*) to apricot and brown sugar mix. Stir the contents for 1-2 minutes then let it sit at room temperature for another 3-4 hours to allow fortified sweet apricot drink to form. This drink can be stored in the refrigerator for 48 hours to 72 hours.

Give a fortified sweet apricot drink after stirring it well to the recovering COVID19 virus infected patient 2-3 times a day. To resolve sleeping disorders, particularly in the recovering COVID 19 virus infected patients, serve fortified sweet apricot drink mixed with juice of 1-2 fresh lemons *(Citrus*×limon) 2-2½ hours before bedtime.

Fortified sweet apricot drink is a suspension containing suspended solids. These solids act as a physical carrier of beneficial microorganisms and physically remove the debris and harmful, microbe-carrying solid contents from the gut. By replacing harmful

microorganisms with beneficial ones, the drink improves the digestion and absorption of essential nutrients, metallic ions and other chemical and biochemical entities in presence of chemical and biochemical functional carrier entities. Furthermore, these entities can carry metabolites, other chemical and biochemical species by physically trapping them or chemically sequestering them. Ultimately, this relaxes gut muscles and nerves, boosts the body's repairing mechanisms, delays premature cell aging and regains homeostasis. Achieving homeostasis is a crucial initial step toward restoring normal physiology in recovering COVID 19 virus infected patients [222,223,226].

COVID 19 virus infection healing infusion

To prepare the COVID 19 virus infection healing infusion, mix ½ cup of tapioca pearls (dried root extract of the Cassava plant, *Manihot esculenta*) with 1 cup of potable water and ½ cup of fresh milk in an airtight glass vessel, and then refrigerate it for 7 hours for chemical and biochemical tailoring (biotransformation) to allow the fortified tapioca pearls mix to form. Separately, soak 2-3 tablespoons of sweet basil seeds (*Ocimum basilicum*) in a mixture of ½ cup of fresh milk and ½ cup of potable water inside an airtight glass vessel at room temperature for 3-4 hours to prepare the sweet basil seeds milk mix.

Boil fortified tapioca pearls mix for 20-25 minutes on a low flame in a covered glass pot. Add 1-2 tablespoons of brown sugar and 1 cup of fresh milk, stirring occasionally while keeping it on a low flame for 10-15 minutes. Allow the fortified tapioca pearls mix to cool to room temperature. Finally, add sweet basil seeds milk mix to fortified tapioca pearls mix and stir well to prepare COVID 19 virus infection healing infusion. COVID 19 virus infection healing infusion can be stored in the refrigerator for up to 48 hours. Serve 3-4 tablespoons of COVID 19 virus infection healing infusion to COVID 19 virus infection recovering patients 2-3 times a day until complete recovery.

The COVID 19 virus infection healing infusion is composed of a complex food system that encases various food components in a gel, while suspending others in an emulsion. This food system is heterogeneous in its consistency, composition and entrapped microbial flora, all housed within a highly complex microstructural architecture, that comprises the food body. As the drink passes through the gastrointestinal tract, it gradually releases nutrients and electrolytes, including the metallic ions. Additionally, it physically sweeps through the gut to introduce beneficial microorganisms, remove unwanted microorganisms, waste, and debris, and augment the absorption of beneficial micronutrients, including metallic ions in presence of chemical and biochemical functional carrier entities. These unique, characteristic features of the COVID 19 virus infection healing infusion make the infusion unmatchable in its design.

Seeds

Nuts, flaxseeds (*Linum usitatissimum*), chia seeds (*Salvia hispanica*), hemp seeds (*Cannabis sativa* L.), sesame seeds (*Sesamum indicum*), pumpkin seeds (*Cucurbita pepo*), sunflower seeds (*Helianthus annuus*), cantaloupe seeds (*Cucumis melo*), watermelon seeds (*Citrullus lanatus*) and cucumber seeds (*Cucumis sativus*) are good and cheap sources of food providing a wide range of nutrients [149,227,228].

Paper content's overview

This work provides a brief overview of the mechanisms driving COVID 19 virus driven illness manifestations and their complications. It proposes a model for curative strategy, presenting evidence that targeted dietary interventions can resolve COVID 19 virus driven illness manifestations, manage their complications and save lives globally. Indeed, the use of recommended diet preparations helped eradicate the COVID 19 virus pandemic in various parts of world, including Pakistan, leading to the World Health Organization (WHO) declaring an end of global health emergency on 4th May 2023.

Digestion plays a critical role in modulating the recovery from COVID 19 virus driven illness manifestations and regaining natural health. This paper highlights specific diet preparations that normalize digestion physiology in recovering COVID 19 virus infected patients, thereby augmenting the absorption of nutrients and bioactive chemical and biochemical entities. These entities play a critical role in modulating cell repairing and regeneration pathways, ultimately hindering the premature aging process in affected cells, protecting patients from long- lasting complications, and restoring natural health worldwide.

Conclusion

Based on the novel findings revealed in data reported by Rab (2007) [44,45,50,60,229-235] a mechanism was proposed to explain how COVID19 virus drives illness manifestations and associated complications. A successful attempt was made to translate this knowledge into designing diet preparations to cure COVID 19 virus driven illness manifestations and their complications. Consumption of these diet preparations allegedly eradicated the COVID 19 pandemic from Pakistan and many regions of the globe, saving a huge number of lives. Furthermore, the pathology involved in many non-contagious diseases, particularly metabolic syndromes, their related consequences, neurodegenerative diseases and retinal degeneration as well as their cures can be explained by the understanding built on findings revealed in the data reported by Rab (2007) [44,45,60,229-235].

Consequently, this creates an opportunity for future research investigations to explore biological sources of bioactive molecular transporters. Specifically, researchers should extend work on biologically significant minerals such as metallic ion transporters originating from biological systems, which have the potential to cross the blood brain barrier. It also invites further study of sequestering agents originating from biological sources present in various diet preparations, ensuring augmented absorption, biological specificity and stability until they pass through the tissue matrix to-reach targeted cellular loci in the cells.

So far, fermented food and desi food (Pakistani, Kashmiri, Indian and Bangladeshi cuisines) prepared with traditional authentic recipes using unadulterated, naturally processed herbs and spices have proven to be the rich sources of these bioactive functional carrier and scavenging molecules and other chemical and biochemical entities. These entities can form radicals, compounds, complexes. Many of them have the potential to stabilize emulsions while promoting the formation of heterogeneous micelles. Ultimately, regular consumption of these diet preparations (cuisines), which possesses prophylactic and therapeutic potential, protects consumers from numerous diseases while augmenting anti-aging and cell repairing processes to promote natural health.

Significance statement

The work presented in the paper reveals the augmented absorption of diet preparations that combat an unusual molecular gaming strategy used by COVID 19 virus to drive illness manifestations. Additionally, the paper presents a hypothetical molecular model underlying COVID 19 virus pathology.

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