

Herbal, Nutritional, and Spiritual Therapies for COVID-19: A Comprehensive Review of Complementary Interventions

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Abstract:

Background: The global health crisis precipitated by COVID-19 has highlighted the urgent need for integrative and supportive therapies in addition to conventional medical interventions. This review aims to comprehensively explore the potential of herbal, nutritional, and spiritual therapies for the prevention and management of COVID-19. Herbal remedies such as *Nigella sativa*, *Withania somnifera*, *Glycyrrhiza glabra*, and *Zingiber officinale* have demonstrated immunomodulatory, antiviral, and anti-inflammatory properties that may support respiratory health and enhance host defense. Nutritional interventions, including supplementation with vitamins D and C, zinc, and probiotics, play a crucial role in maintaining immune resilience and mitigating infection severity. Furthermore, spiritual practices such as prayer, meditation, and yoga contribute to psychological well-being, reduce stress-induced immunosuppression, and promote holistic recovery in patients. By integrating evidence-based complementary therapies with biomedical approaches, this review advocates a more inclusive strategy for combating COVID-19, especially in low-resource settings. These findings underscore the importance of further clinical validation and policy-level recognition of alternative approaches to pandemic preparedness and public health resilience.

Keywords: COVID-19, Herbal medicine, Nutritional therapy, Spiritual healing, Immune modulation, Complementary and alternative medicine (CAM), *Nigella sativa*, Vitamin D, Probiotics, Mind-body intervention, Integrative health, Antiviral herbs, Pandemic management, Holistic recovery, Stress and immunity

Introduction

The global outbreak of coronavirus disease 2019 (COVID-19), caused by the novel pathogen severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has led to a profound and multifaceted global crisis. As of 2025, the pandemic has claimed millions of lives, strained healthcare systems, and disrupted economies and social structures across both developed and developing nations. While the rapid development and emergency authorization of several vaccines and antiviral drugs marked a remarkable achievement in biomedical science, numerous challenges remain. These include the continuous emergence of viral variants with increased transmissibility or immune escape potential, persistent vaccine hesitancy in many populations, disparities in vaccine access between high- and low-income countries, and the growing burden of post-acute sequelae of COVID-19, commonly referred to as “long COVID” (Joshee et al., 2022; Yelin et al., 2020).

In light of these ongoing challenges, there has been a renewed interest in the role of complementary and integrative medicine (CIM) in managing both acute and chronic manifestations of COVID-19. Integrative approaches—rooted in traditional, culturally-embedded healing

practices—are increasingly being explored alongside conventional medical therapies. Among the most widely adopted interventions are herbal medicine, nutritional support, and spiritual or mind-body therapies. These modalities have gained popularity not only due to their accessibility and cultural relevance but also because of emerging evidence supporting their immunomodulatory, antiviral, and psychological benefits (Lopez-Leon et al., 2021; Bourmistrova et al., 2022). Their use has been particularly prominent in regions with strong traditions in systems like Ayurveda, Traditional Chinese Medicine (TCM), Unani, and Islamic Prophetic medicine.

This article presents a comprehensive, evidence-based review of herbal, nutritional, and spiritual therapies that have been applied in the context of COVID-19. The discussion is structured to critically examine their mechanisms of action, clinical evidence, safety concerns, and practical implications for both individual and public health. By synthesizing data from scientific literature, clinical trials, and traditional knowledge systems, this review aims to contribute to a nuanced understanding of how complementary approaches can support mainstream healthcare. It also seeks to inform future directions in clinical practice, policy

formulation, and interdisciplinary research for more holistic and equitable pandemic response strategies.

2. Long-Term Effects of COVID-19

The long-term effects of COVID-19, often referred to as “Long COVID” or Post-Acute Sequelae of SARS-CoV-2 infection (PASC), represent a significant and complex public health challenge in the post-pandemic landscape. Unlike the acute phase of infection, which is generally time-bound, Long COVID encompasses a spectrum of symptoms that persist beyond four weeks, and in many cases, for several months. This syndrome affects individuals regardless of the severity of their initial illness. Reports from both clinical settings and community-based studies indicate that even individuals who experienced mild or asymptomatic infections are not immune to its chronic consequences (Lopez-Leon et al., 2021; Yelin et al., 2020). As such, Long COVID is not only a medical issue but a socio-economic burden, affecting workforce productivity, mental health, and healthcare systems globally.

Systematic reviews and meta-analyses have catalogued a diverse range of lingering symptoms associated with Long COVID. A prominent meta-analysis conducted by Lopez-Leon et al. (2021) identified more than 50 persistent symptoms among recovered patients. The most prevalent of these included fatigue (reported in approximately 58% of cases), headache (44%), attention disorders or “brain fog” (27%), as well as

respiratory issues like shortness of breath. These symptoms can significantly impair quality of life, often rendering individuals unable to resume normal daily activities. Additionally, Levine (2022) reported that nearly 20% of American adults aged 18 to 64 who survived COVID-19 developed new, long-term health conditions, underscoring the extensive and enduring burden of the disease on the population’s health and functional capacity.

Neurological complications have emerged as particularly alarming features of Long COVID. SARS-CoV-2 has demonstrated neurotropic characteristics, with the ability to cross the blood-brain barrier and elicit widespread neuroinflammation. This may account for the cognitive dysfunction, memory loss, and executive dysfunction observed in many survivors. Heneka et al. (2020) highlighted the potential for COVID-19 to increase the risk of neurodegenerative diseases such as Alzheimer’s and Parkinson’s through mechanisms involving glial cell activation, oxidative stress, and sustained immune activation. Furthermore, COVID-19 survivors show increased rates of depression, post-traumatic stress disorder (PTSD), and anxiety, reflecting both the neurobiological and psychosocial impacts of the virus (Bourmistrova et al., 2022). Sleep disorders, including insomnia and altered sleep cycles, have also been reported with greater frequency in post-infection cohorts, likely linked to both psychological stress and central nervous system inflammation

Table 1. Common Long-Term Effects of COVID-19 (Long COVID)

System Affected	Common Symptoms	Supporting Evidence / Source
General/Systemic	Fatigue (58%), malaise, post-exertional fatigue	Lopez-Leon et al., 2021
Neurological	Brain fog, memory loss, cognitive impairment, headache (44%), dizziness	Heneka et al., 2020; Lopez-Leon et al., 2021
Respiratory	Shortness of breath, chronic cough, reduced lung function	Lopez-Leon et al., 2021; Del Rio et al., 2020
Psychological/Psychiatric	Depression, anxiety, PTSD, mood swings	Bourmistrova et al., 2022
Cardiovascular	Palpitations, chest pain, myocarditis, postural orthostatic tachycardia syndrome (POTS)	Yelin et al., 2020
Sleep Disorders	Insomnia, altered sleep-wake cycles	Bourmistrova et al., 2022
Gastrointestinal	Diarrhea, nausea, abdominal pain, gut dysbiosis	Del Rio et al., 2020
Musculoskeletal	Myalgia, joint pain	Lopez-Leon et al., 2021
Dermatological	Hair loss, skin rashes	Lopez-Leon et al., 2021
Metabolic/Endocrine	New-onset diabetes, weight changes, hormonal imbalances	Levine, 2022; Joshee et al., 2022

The pathophysiology of Long COVID is not yet fully understood but is believed to be multifactorial. Several hypotheses have been proposed, including the persistence of viral RNA fragments in tissues, chronic immune dysregulation with aberrant cytokine profiles, endothelial dysfunction, and microvascular injury. Additionally, gastrointestinal disturbances and gut microbiota dysbiosis may contribute to systemic inflammation and metabolic abnormalities, further perpetuating the disease state (Del Rio et al., 2020). Ayati et al. (2020) discussed the significant overlap between post-viral fatigue syndromes and Long COVID, suggesting that COVID-19 may act as a trigger for broader post-infectious syndromes that share immunological and neurological pathways.

Effective management of Long COVID necessitates an interdisciplinary and patient-centered approach. Given the variety of organ systems involved, patients often require coordinated care across pulmonology, neurology, cardiology, psychiatry, and rehabilitation medicine. Rehabilitation programs focusing on graded exercise therapy, cognitive training, and breathing exercises have shown promise in alleviating some symptoms. Nutritional support and psychological counseling are also critical components of recovery, especially for individuals with significant fatigue and mood disorders. Ongoing studies continue to assess the influence of early antiviral treatment, vaccination status, and the presence of comorbidities on the trajectory and prognosis of Long COVID (Joshee et al., 2022). There is a growing consensus that Long COVID should be treated as a chronic condition, requiring long-term monitoring and support infrastructure.

3. Herbal Therapies for COVID-19

Herbal medicine, a foundational component of traditional healing systems such as Ayurveda, Traditional Chinese Medicine (TCM), and Unani, has gained considerable global attention during the COVID-19 pandemic. These systems employ

botanicals known for their immunomodulatory, antiviral, and anti-inflammatory properties (Ahmad et al., 2021; Ang et al., 2020). Numerous plant-derived compounds have been investigated for their potential to alleviate COVID-19 symptoms and associated complications.

Nigella sativa, commonly known as black seed, is one of the most extensively studied medicinal plants in this context. Revered in Islamic traditional medicine, it contains thymoquinone, a bioactive constituent that has demonstrated immunoregulatory, anti-inflammatory, and antiviral effects (Chakraborty et al., 2021; Salem & Hossain, 2020). A clinical trial conducted in Pakistan reported that a combination of *Nigella sativa* and honey facilitated faster clinical recovery and viral clearance in patients with mild COVID-19 symptoms (Ashraf et al., 2021).

Withania somnifera, known as ashwagandha, is another important botanical used in Ayurveda. It has shown potential in mitigating stress-induced immune dysfunction and may help alleviate anxiety and fatigue, which are prevalent in individuals experiencing long COVID (Singh et al., 2021). Molecular docking studies have further indicated that withanolides from this plant possess binding affinity to the SARS-CoV-2 spike protein, suggesting possible antiviral activity (Tandon et al., 2021).

Glycyrrhiza glabra, or licorice root, contains the compound glycyrrhizin, which has demonstrated antiviral efficacy against SARS-CoV and SARS-CoV-2 in vitro. It also exhibits anti-inflammatory effects by reducing interleukin-6 (IL-6) and other pro-inflammatory cytokines frequently elevated in severe COVID-19 cases (Fiore et al., 2021; Yang et al., 2020).

Other widely utilized herbs, including *Zingiber officinale* (ginger), *Curcuma longa* (turmeric), and *Echinacea purpurea*, are traditionally recommended for enhancing respiratory health and immune resilience. These botanicals have shown antioxidant and cytokine-modulating effects in preclinical and clinical studies (Kaul et al., 2021; Ghasemian et al., 2021).

Table 2. Prominent Herbal Therapies for COVID-19 and Their Mechanisms of Action

Herb	Key Active Compound(s)	Proposed Actions	Supporting Evidence
Nigella sativa (Black seed)	Thymoquinone	Antiviral, immunomodulatory, anti-inflammatory; enhances T-cell	Chakraborty et al., 2021; Salem & Hossain,

		response; reduces cytokine storm	2020; Ashraf et al., 2021
Withania somnifera (Ashwagandha)	Withanolides	Stress adaptation, immunomodulation, anxiolytic; potential spike protein binding (antiviral)	Singh et al., 2021; Tandon et al., 2021
Glycyrrhiza glabra (Licorice root)	Glycyrrhizin	Antiviral, IL-6 suppression, cytokine modulation; inhibits viral replication	Fiore et al., 2021; Yang et al., 2020
Zingiber officinale (Ginger)	Gingerols, Shogaols	Anti-inflammatory, antioxidant, supports respiratory health, reduces cough and sore throat	Kaul et al., 2021
Curcuma longa (Turmeric)	Curcumin	Antioxidant, anti-inflammatory, inhibits NF- κ B signaling; supports lung and liver function	Ghasemian et al., 2021
Echinacea purpurea	Alkylamides, caffeic acid derivatives	Immune stimulation, antiviral activity, enhances phagocytosis	Ghasemian et al., 2021

While early findings are encouraging, many of these herbal treatments lack validation from large-scale, randomized, double-blind, placebo-controlled clinical trials. Concerns remain regarding standardization, optimal dosing, potential herb-drug interactions, and regulatory oversight (Patwardhan et al., 2020). Nevertheless, herbal medicines present a promising complementary option, particularly in settings with limited access to conventional treatments or as supportive therapies alongside vaccination and pharmacological care.

4. Nutritional Interventions for COVID-19

Nutritional status plays a pivotal role in the functioning of the immune system and can significantly influence the severity and progression of infectious diseases, including COVID-19. As the pandemic unfolded, there was increasing attention to how micronutrients, dietary patterns, and gut health might modulate immune responses and affect susceptibility to SARS-CoV-2 (Butler & Barrientos, 2020; Calder, 2020).

Micronutrients and COVID-19 Outcomes

Among the most studied micronutrients during the pandemic is vitamin D. Known for its immune-modulatory and anti-inflammatory roles, vitamin D deficiency has been linked to increased severity of COVID-19 infections and higher mortality (Grant et al., 2020; Meltzer et al., 2020). Vitamin D enhances the expression of antimicrobial peptides and regulates cytokine response, which is particularly relevant in preventing cytokine storm (Daneshkhah et al., 2020; Pereira et al., 2020). Meta-analyses suggest that supplementation may help reduce respiratory infections and improve overall outcomes (Martineau et al., 2017).

Vitamin C, another essential antioxidant, has long been used in the prevention and treatment of respiratory infections. It reduces oxidative stress and supports epithelial barrier function and immune cell activity. In COVID-19, intravenous vitamin C has been trialed in critically ill patients, with mixed outcomes, while oral supplementation is commonly used to support general immune health (Carr & Rowe, 2020; Holford et al., 2020). Zinc is critical for antiviral defense and is known to inhibit viral replication, including that of coronaviruses (Skalny et al., 2020; Wessels et al., 2020). Zinc supplementation has been associated with reduced duration and severity of upper respiratory tract infections and may play a similar protective role in COVID-19 (Read et al., 2019). Similarly, selenium, an essential trace element, enhances the activity of glutathione peroxidase and other antioxidant enzymes, helping to mitigate the oxidative damage observed in severe COVID-19 cases (Zhang et al., 2020).

Role of Diet and Dietary Patterns

The overall quality of diet is a strong determinant of immune health. Plant-based diets, rich in antioxidants, fiber, vitamins, and minerals, are associated with reduced inflammation and better immune responses. A study by Li et al. (2021) showed that individuals consuming plant-based or pescatarian diets had lower risk of moderate-to-severe COVID-19 compared to those with high meat intake. Similarly, adherence to the Mediterranean diet, which emphasizes olive oil, vegetables, legumes, and fish, is linked to decreased systemic inflammation and reduced incidence of chronic diseases that predispose individuals to severe COVID-19 (Galanakis et al.,

2020; Vitale et al., 2021).

Emerging interest in intermittent fasting has led to the hypothesis that time-restricted feeding may support autophagy, reduce inflammation, and improve metabolic markers. While more research is needed, early data suggests that fasting might positively influence viral immunity and post-infection recovery (Nagai et al., 2019; Patterson et al., 2015).

Gut Health and Probiotics

The gastrointestinal tract is a key immune organ, and the gut microbiota plays a major role in regulating systemic immunity. Many COVID-19 patients present with gastrointestinal symptoms, and gut dysbiosis has been documented, particularly in severe cases (Mak et al., 2020). Probiotic supplementation may help restore microbiome balance, reduce inflammation, and support mucosal immunity (Ceccarelli et al., 2021). Species such as *Lactobacillus* and *Bifidobacterium* have been proposed as adjuncts to COVID-19 management (Baud et al., 2020).

Limitations and Cautions

While nutritional interventions offer a promising low-cost and accessible strategy to enhance immunity, especially in populations with micronutrient deficiencies, they should not be viewed as alternatives to vaccines or antiviral medications. Rigorous, large-scale clinical trials are still needed to validate the therapeutic efficacy of these approaches specifically for COVID-19 (Jayawardena et al., 2020). Moreover, indiscriminate supplementation without medical supervision may carry risks, particularly with fat-soluble vitamins and trace elements.

5. Spiritual and Psychological Therapies for COVID-19

The COVID-19 pandemic has had not only physiological impacts but also profound psychological and spiritual consequences. Isolation, fear of contagion, grief, and economic uncertainty have collectively contributed to an upsurge in mental health issues worldwide. In this context, spiritual and psychological therapies have emerged as vital coping mechanisms, offering support that complements medical and public health strategies (Bourmistrova et al., 2022; Koenig, 2020).

5.1. Psychological Stress and Immune Response

Chronic stress and psychological distress are known to impair immune function, increase susceptibility to infection, and delay recovery. During the COVID-19 pandemic, elevated levels

of depression, anxiety, and post-traumatic stress disorder (PTSD) were widely reported (Vindegaard & Benros, 2020). Psychological interventions such as cognitive behavioral therapy (CBT), mindfulness-based stress reduction (MBSR), and acceptance and commitment therapy (ACT) have shown efficacy in managing anxiety and depressive symptoms and may indirectly benefit immune competence by reducing systemic inflammation (Dantzer et al., 2008; Zangi et al., 2012).

5.2. Spirituality, Religion, and Mental Health

Spirituality and religious practices play a crucial role in resilience and well-being, particularly in times of crisis. During the pandemic, many individuals turned to prayer, religious rituals, and faith communities for psychological comfort and existential support. Research indicates that spirituality is positively correlated with reduced anxiety, lower levels of perceived stress, and improved coping during health crises (Koenig, 2020; Thomas & Barbato, 2020). Faith-based coping mechanisms such as religious supplication, spiritual acceptance, and service to others can enhance psychological well-being and reduce feelings of isolation (Ano & Vasconcelles, 2005). In Islamic traditions, practices such as *dhikr* (remembrance of God), *du'a* (supplication), and *ruqyah* (spiritual healing) are considered means of seeking protection and healing from illness. Prophetic traditions emphasize spiritual hygiene, quarantine during plagues, and trust in divine wisdom alongside seeking medical treatment (Alrawi & Fetters, 2012). Several scholars have highlighted the importance of integrating Islamic spirituality with biomedical care for Muslim patients affected by COVID-19 (Padela & Curlin, 2013).

5.3. Mindfulness and Meditation

Mindfulness and meditative practices help regulate the hypothalamic–pituitary–adrenal (HPA) axis and modulate inflammatory cytokine release. Randomized trials suggest that mindfulness meditation may reduce psychological distress and boost immune parameters such as antibody titers and natural killer (NK) cell activity (Black & Slavich, 2016; Creswell et al., 2012). Apps and online meditation platforms experienced a surge in use during lockdowns, providing scalable options for mental health support.

5.4. Community and Social Connection

Social isolation during the pandemic was a major predictor of mental health deterioration.

Community-based spiritual and psychological support networks helped mitigate this isolation by fostering belonging, meaning, and mutual aid. Initiatives led by religious organizations, spiritual leaders, and mental health professionals created virtual spaces for communal healing and grief processing (Galea et al., 2020).

5.5. Limitations and Future Directions

Despite the documented psychological and physiological benefits of spiritual practices, many interventions lack standardized protocols or outcome measures. There is also cultural variability in acceptance and practice of spiritual therapies, which must be considered when designing interventions (Park, 2010). Future research should explore integrative models that combine psychological therapy, spirituality, and biomedical care, especially in pandemic preparedness frameworks.

6. Integration and Limitations

The COVID-19 pandemic has demonstrated the limitations of conventional biomedical approaches in addressing the multifaceted challenges of a global health crisis. While vaccines, antiviral therapies, and critical care have undoubtedly saved millions of lives, the persistence of infection waves, vaccine hesitancy, long-term complications, and psychological distress have necessitated a more integrative, holistic model of care (Calder, 2020; Jayawardena et al., 2020).

Complementary Therapies as Adjuncts, Not Alternatives

Herbal, nutritional, and spiritual interventions should be viewed as adjuncts to mainstream treatment rather than replacements. For example, the immunomodulatory effects of *Nigella sativa*, *Withania somnifera*, and glycyrrhizin are promising, but they are not yet supported by robust, large-scale clinical trials to justify exclusive use (Ahmad et al., 2021; Fiore et al., 2021). Similarly, while vitamin D, zinc, and probiotics have shown potential benefits, their effectiveness is often dependent on baseline nutritional status and cannot substitute for proven antiviral strategies (Butler & Barrientos, 2020; Gombart et al., 2020).

Standardization and Quality Control Challenges

A major limitation in the field of complementary medicine is the lack of standardization in dosage, formulation, and quality assurance. Herbal products may vary in their bioactive constituents based on geography, preparation method, and

storage conditions. Additionally, herb-drug interactions remain a critical safety concern for patients taking conventional medications (Patwardhan et al., 2020). Nutritional supplements, though generally safe, can lead to toxicity when consumed in excess, particularly fat-soluble vitamins like A and D (Kennedy et al., 2021).

Evidence Gaps and Research Design Limitations

While the integrative strategies discussed in this review are supported by observational studies, case reports, and some clinical trials, the evidence base remains limited. Many studies suffer from small sample sizes, lack of randomization, and insufficient blinding. Furthermore, outcome measures often focus on surrogate markers (e.g., cytokine levels) rather than clinical endpoints like survival or hospitalization duration (Jayawardena et al., 2020; Li et al., 2021).

Cultural and contextual variations also affect the generalizability of findings. Spiritual and religious practices are deeply personal and culturally embedded, making it difficult to design standardized interventions that can be tested across populations (Koenig, 2020; Park, 2010).

Implementation and Equity

Even when evidence supports their use, implementation of complementary therapies is uneven. Many healthcare providers lack training in integrative medicine, and patients often self-administer herbal or nutritional remedies without guidance. Furthermore, access to high-quality supplements or traditional therapies may be limited in low-income settings, exacerbating health inequities (Padela & Curlin, 2013; Galea et al., 2020).

To maximize the potential of complementary therapies, there is a need for regulatory oversight, interdisciplinary collaboration, and community-based education. Healthcare systems must create space for culturally sensitive, patient-centered care that recognizes the value of integrative approaches without compromising scientific rigor.

7. Conclusion

The COVID-19 pandemic has not only tested the limits of modern medicine but also reignited global interest in holistic health approaches. As the virus continues to evolve and its long-term consequences become more apparent, a comprehensive response must extend beyond vaccines and pharmaceuticals. This review highlights the role of herbal, nutritional, and

spiritual therapies as valuable adjuncts in managing COVID-19 and its aftermath.

Herbal remedies such as *Nigella sativa*, *Withania somnifera*, and *Glycyrrhiza glabra* exhibit promising antiviral and immunomodulatory properties. Nutritional interventions involving vitamins D and C, zinc, selenium, probiotics, and whole-food diets offer low-cost options to bolster immune health. Meanwhile, spiritual and psychological therapies ranging from mindfulness meditation to religious coping and community support have demonstrated effectiveness in mitigating pandemic-related mental health burdens.

However, the integration of these complementary approaches into mainstream care must be guided by scientific rigor, ethical practice, and cultural sensitivity. Evidence gaps, standardization challenges, and risks of self-medication must be addressed through interdisciplinary research and policy development. Importantly, such interventions should be framed not as alternatives to biomedical care but as components of a more inclusive, patient-centered model of health.

In moving forward, the pandemic offers an opportunity to rethink healthcare delivery, recognizing that resilience to crises lies not only in medical technology but also in nutrition, mental wellness, community cohesion, and traditional knowledge systems. By embracing this integrative vision, we can enhance both preparedness and recovery in current and future global health challenges.

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