[Case Report] Supplementation with Vitamin D, Zinc, and Quercetin to Treat COVID-19: A Case Report

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Abstract

Objective: The purpose of this case report is to analyze the treatment of a patient with COVID-19 using the combination of vitamin D, zinc, and quercetin.

Clinical Features: A 23-year-old female presented with COVID-19. She had been triple vaccinated with Moderna. Advil alleviated her fever, myalgias, pharyngitis, and headache. However, her symptoms of a productive cough, nasal congestion, fatigue, ageusia, and anosmia were unchanged. Her cough and nasal interfered with her sleep.

Intervention/Outcome: The combination of 5,000 IU of vitamin D, 100 mg of zinc, and 1,000 mg of quercetin 3 times a day with meals was utilized to control her symptoms. After 1 day of supplementation, she experienced an improvement in her fatigue and nasal congestion. After 3 days of supplementation, her cough abated and her fatigue, nasal congestion, ageusia, and anosmia were greatly improved. Complete resolution of symptoms occurred after 6 days of treatment.

Conclusion: The combination of vitamin D, zinc, and quercetin may have contributed to the resolution of COVID-19.

Introduction

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was the infectious agent that caused coronavirus disease-19 (COVID-19) during the 2019 pandemic.[1] The first cases of the infection were reported in the city of Wuhan, China, and gradually spread worldwide.[1] The SARS-CoV-2 infected the population of 223 countries and overwhelmed the healthcare systems resulting in the prolonged shutdown of many cities around the world.[2] To date, over 593 million cases and over 6 million deaths have been documented globally.[2] The highest number of cases were in the U.S., India, and Brazil.[2] In the U.S., COVID-19 was the third leading cause of death in 2020 with 375,000 deaths.[2]

SARS-CoV-2 is an enveloped virus from the order of Nidovirales and genera alphacoronavirus.[3] The virus is transmitted to a new host through direct or indirect exposure to the respiratory droplets of an infected host.[3] SARS-CoV-2 binds to angiotensin-converting enzyme (ACE) receptors in the respiratory tract and small intestine infiltrating the cells and causing an infection.[3] The incubation period of the virus is 4 to 6 days.[4] The symptoms of COVID-19 that manifest are a combination of fever, chills, fatigue, headache, cough, dyspnea, malaise, myalgias, pharyngitis, anosmia, and ageusia.[3] Infections from the SARS-CoV-2 last 15 days on average.[5] However, the symptoms persist for 21 days or longer in about 25% of those infected.[5]

The pathophysiology of COVID-19 may arise from the activation of various inflammatory markers. The virus up-regulates the gene expression of nuclear factor-κB (NF-κB) and by extension the proinflammatory arachidonic cascade and the production of proinflammatory eicosanoids.[3] In addition, NF-κB stimulates the release of inflammatory interleukins (IL), specifically IL-1, IL-6, and IL-8, tumor necrosis factor α (TNF-α), and monocyte chemotactic protein (MCP)-1.[3] In addition, elevated levels of C-reactive protein (CRP) were observed in patients with severe COVID-19.[6]

Another factor that contributes to the pathophysiologic state of COVID is oxidative stress.[7] Reactive oxygen species (ROS) intensify the inflammatory process with the potential to exacerbate symptoms during an infection.[7] Consequently, prooxidants amplify inflammation causing further damage to endothelial and nervous tissue, resulting in neuroinflammation, and disrupting the formation of neurotransmitters.[7]

Conventional medicine utilizes vaccinations to decrease the incidence of COVID and medications for the treatment of SARS-CoV-2 infections. Vaccine efficacy varies from 66.9% to 95% depending on the agent administered.[8] However, after 2 months, the effectiveness of the vaccine begins to decline.[8] The 2-dose regimen for the Pfizer BNT162b2 and Moderna mRNA-1273 effectiveness is diminished from 94.5% and 95.9% to 66.6% and 80.3% respectively.[8] In addition, vaccines do not prevent infection. It reduces the severity and potential for hospitalization and death.[8] However, one study found that 37.7% of hospitalized patients in a cohort of 434 were fully vaccinated.[9] While medications have some benefit for the treatment of COVID, the safety and the efficacy of these pharmaceuticals varies for moderate and severe cases and none have reduced the incidence of mortality.[10][11]

Consequently, the use of natural supplements may provide a therapeutic benefit for the treatment of COVID. Research indicates that vitamin D, quercetin, and zinc can ameliorate the symptoms of coronavirus infections.[3] A possible

explanation for the improvement in symptoms observed with the supplementation of these nutraceuticals may be an attenuation of inflammatory mediators and an increase in antioxidant activity.[3] An additional effect of these supplements is the potentiation of immune function, which may augment the body's natural defense system, increasing the ability of the body to fight the infection.[3] The purpose of this case report is to explore the treatment of COVID utilizing the combination of vitamin D, quercetin, and zinc.

Case Report

A telehealth call was conducted with a 23-year-old female that tested positive for COVID. She received the 2-dose regimen of Moderna and 1 booster several months prior to the onset of her infection. Her symptoms onset 6 days prior to the appointment and consisted of fatigue, fever, chills, myalgias, pharyngitis, and a headache. The day after the onset of her symptoms she developed a productive cough and persistent nasal congestion. She took a 200 mg tablet of over-the-counter (OTC) Advil 3 times a day on days 1, 2, and 3 of her infection. By day 4, her fever, chills, pharyngitis, headache, and myalgias had dissipated and she discontinued the use of Advil.

However, her productive cough, nasal congestion, and fatigue remained unchanged and severe. She rated her cough at 7 out of 10 on a numeric scale with 0 being the least severe and 10 being the most severe. Her nasal congestion was rated at 10 out of 10. She reported that she had to blow her nose every 10-15 minutes. The combination of her cough and nasal congestion disrupted her sleep. She was only able to sleep for about 2 hours. The patient experienced severe fatigue, which she rated at 9 out of 10. Ageusia and anosmia began 4 days after the onset of her infection. By the time of her appointment, she estimated that the severity of ageusia and anosmia was 6 out of 10. Her symptoms are outlined in Table 1.

Table 1. Severity of Symptoms Prior to Treatment

Symptom	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Cough	0	7	7	7	7	7
Nasal Congestion	0	10	10	10	10	10
Ageusia and Anosmia	0	0	0	6	6	6
Fatigue	9	9	9	9	9	9
Hours of Sleep	5-6	2-3	2-3	2-3	2-3	2-3

** *Numeric scale 0-10 with 0 being least severe and 10 being most severe.*

The patient was a healthy female with no chronic diseases. She took her temperature at the time of the appointment, which was 98.9° F. As it was a telehealth call, no other exam was performed. The treatment strategy consisted of 5,000 IU of vitamin D, 100 mg of zinc, and 1,000 mg of quercetin 3 times a day with meals until the resolution of her symptoms.

Results

On day 7 of her infection, she was able to purchase generic brands of vitamin D and zinc at a local store and took them twice after her appointment. At the end of the day, her cough, ageusia, and anosmia remained unchanged. However, she felt an alleviation of her nasal congestion, which was 7 out of 10. She felt the need to blow her nose every 30 minutes and slept for 5 hours that night. She reported that her fatigue improved as well and was rated at 6 out of 10.

On day 8 of her infection, she was able to purchase quercetin at a local store and began taking vitamin D, zinc, and quercetin 3 times a day. That evening her cough was reduced to a 1 out of 10, but her nasal congestion was still ranked at 7 out of 10. She was blowing her nose more often and felt the need to blow her nose 5 times every 30 minutes. Despite her need to blow her nose more often, she was able to sleep for 5 hours that night. Her ageusia and anosmia slightly declined to 4 out of 10. She rated her fatigue at 4 out of 10.

On day 9 of her treatment, her cough had resolved, and her nasal congestion was a 3 out of 10. She blew her nose 1 time an hour. She rated her fatigue at a 2 out of 10 and her sleep pattern normalized at her typical 8 hours that night. Her ageusia and anosmia were a 2 out of 10.

On day 10, her fatigue, ageusia, and anosmia had abated and was rated at a 0 out of 10. She was able to breathe better through her nose and ranked her nasal congestion at a 1 out of 10. She was blowing her nose 1 time every 2-3 hours. Her nasal congestion was at a 1 out of 10 on day 11 of her treatment and was resolved by day 12. Her symptoms after treatment are outlined in Table 2.

Table 2. Severity of Symptoms After Treatment

Symptom	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Cough	7	1	0	0	0	0
Nasal Congestion	7	7	3	1	1	0
Ageusia and Anosmia	6	4	2	0	0	0
Fatigue	6	4	2	0	0	0
Hours of Sleep	5	5	8	8	8	8

[**] *Numeric scale 0-10 with 0 being least severe and 10 being most severe.*

Discussion

This was a case of a previously triple-vaccinated female with COVID that experienced partial relief of her symptoms after the administration of OTC Advil. However, her productive cough, nasal congestion, ageusia, anosmia, fatigue, and interrupted sleep persisted. A natural medicine therapeutic approach may have improved her symptoms and resolved her infection.

Each of the supplements chosen has been employed as a monotherapy to attenuate symptoms of COVID and promote the resolution of the infection. A case series signifies the positive attributes of supplementing with zinc for the treatment of COVID. The case series demonstrated that supplementing with less than 50 mg of zinc a day did not improve COVID symptoms while supplementing with over 100 mg of zinc a day diminished symptoms and resolved the infection.[3] On average, the patient's symptoms began to abate over a 10 to 14-day period while using over 100 mg of zinc as a monotherapy.[3] Consequently, zinc may have had an impact on her infection, but the rapid decline in her symptoms was probably influenced to a greater degree by vitamin D or quercetin or the combination of the 3 supplements.

Vitamin D is essential for treating COVID. Studies indicate that individuals with low serum vitamin D are more susceptible to upper respiratory tract infections, especially COVID, and that a vitamin D deficiency is associated with a severe infection.[12][13][14][15][16][17][18][19] Sabico et al determined that a dosage of 5,000 IU a day of vitamin D could diminish the severity of the infection and improve cough and ageusia.[2] In addition, supplementing with vitamin D can resolve COVID after about 5 to 9 days.[3] This may reveal that vitamin D was the more valuable supplement included in the regimen, although it is impossible to determine.

However, one study using 500 mg of quercetin 3 times a day resolved COVID symptoms after 7 days in 57% of patients compared to 19% receiving standard care.[20] A second study by Di Pierro et al revealed that patients with mild to moderate COVID that ingested 1,000 mg of quercetin 2 times a day had a 9.2% chance of being hospitalized and a 1.3% chance of requiring ventilation. Quercetin also prevented mortality.[21] This was much lower than the standard therapy group. In this group, participants had a 28.9% chance of being hospitalized and a 19.7% chance of requiring ventilation with 10.5% of those receiving standard care being admitted to the intensive care unit, and 3.9% dying.[21] This data reflects the positive attributes of utilizing quercetin for the treatment of COVID, signifying that it may have had an impact in this case.

All 3 supplements can have a beneficial effect when utilized for the treatment of COVID. In this case, supplementing with vitamin D and zinc appeared to have an immediate effect. These supplements were used on day 1 of the treatment and at the end of day 1 she experienced a slight improvement in her nasal congestion and fatigue. The next day quercetin was added to the treatment regimen and the severity of her cough was reduced from 7 out of 10 to 1 out of 10 by the end of the 2nd day of treatment. This could imply that using quercetin in conjunction with zinc and vitamin D generated a synergistic effect that alleviated her cough and improved her overall condition. This seems probable as synergism between zinc and quercetin has been observed in the research. Unfortunately, the data related to the combination of the 3 supplements is limited.

In this case, the improvement in her symptoms may have been associated with the ability of the supplements to reduce inflammation and oxidative stress and enhance immune function. NF-κB, IL-1, IL-6, IL-8, TNF-α, MCP-1, and CRP activity is elevated during a coronavirus infection.[3] Vitamin D, zinc, and quercetin have the ability to down-regulate the activation of NF-κB and inhibit the secretion of IL-1, IL-6, IL-8, TNF-α, MCP-1, and CRP.[3][22][23][24]

Oxidative stress contributes to the pathophysiology of COVID.[7] Supplementation with vitamin D, zinc, and quercetin can mitigate oxidative stress. Vitamin D, zinc, and quercetin up-regulate glutathione peroxidase activity.[25][26][27] In addition,

zinc and quercetin can increase antioxidant status through an increase in the activity of superoxide dismutase, glutathione-S-transferase, and catalase.[25][26][28][29] The combination of the anti-inflammatory and antioxidant properties of the supplements may have been responsible for diminishing her symptoms.

An additional effect of these supplements that may have contributed to the resolution of her symptoms is their capacity to act as immunostimulants. Vitamin D up-regulates the conversion of monocytes to macrophages and augments phagocytosis.[3] Quercetin also enhances phagocytic activity and the function of natural killer cells.[3] Zinc promotes and maintains the immune response regulated by the innate and adaptive immune systems.[3] In addition, the mineral increases the transcription of immune proteins and the division of immune cells.[3] Stimulating the immune system may fortify the natural immune defense systems of the body.

Limitations

There are several limitations in this case. The first limitation is that the treatment strategy was used for a single case. Other individuals may not have a favorable response. However, as each individual treatment has been shown to be effective, the combination of the supplements may have assisted with the resolution of her COVID symptoms. Another limitation is that the assessment of her improvements was based on a subjective numeric scale, which could be attributed to the placebo effect. A limitation is that the appointment was conducted via telehealth and all correspondences were via email. Consequently, a formal exam was not performed on the patient and the patient could not be physically evaluated while following the progress of her infection. This was unavoidable as the patient was infected with a contagious disease and to minimize the exposure of the healthcare professional and staff the appointment was performed electronically. This may have led to miscommunications or misinterpretations of her progress. Lastly, as a combination therapy was employed, it is impossible to determine which supplement may have had the greatest influence on her infection or if the supplements generated synergism.

Conclusion

A patient with COVID responded favorably to a treatment approach using vitamin D, zinc, and quercetin.

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