

**RESEARCH ARTICLE****EXPLOITING COVID-19: QUACK-A-MOLE****Authors**

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**Abstract**

The term “quack” has always been synonymous with shouting about one’s dubious medical remedies in the public marketplace; however, modern quacks amplify their aggressive and deceptive advertising campaigns worldwide using social media and internet-based mechanisms. While many in the United States have suffered significant illness and economic hardship as the result of the COVID-19 pandemic, purveyors of pseudoscientific therapies have enriched themselves. The United States Food and Drug Administration has taken steps to mitigate the claims of over 65 individuals or companies claiming to prevent or treat SARS-CoV2, but this effort has been eclipsed by the sheer number of individuals who continue to surface and exploit public credulity. Moreover, those selling the same types of products and making the same types of claims received FDA warning letters during previous public health crises. The majority of letter recipients were selling products in five categories: colloidal silver, cannabis or related products, essential oils, vitamins, and minerals. Those in the rapidly expanding self-care industry will continue to spread medical caveat emptor both now and during the next pandemic unless the medical community begins directly opposing the normalization of unproven and misleading advertising claims.

## 1. Introduction

The United States Food and Drug Administration (FDA) sent 89 warning letters to companies during the spread of SARS or H1N1 (Swine flu).<sup>1-3</sup> At the time of this writing (June 2020 during the COVID-19 pandemic), the FDA sent at least 87 more warning letters to producers of the same types of products: supplements, cannabinoids, colloidal silver, essential oils, and herbal remedies.<sup>4</sup> Many of those who received warning letters have not taken these claims down from their websites and/or Facebook pages, several have made similar posts after responding to the letters, and others have even promoted additional products as having “antiviral” properties. One can easily find numerous other companies who apparently have not been sent warning letters selling similar products and making the same claims. Like the carnival game, “whack-a-mole,” when one company advertising dubious remedies is threatened with legal action and removes unsubstantiated claims, another one rises to take its place.

We downloaded all COVID-19-related warning letters sent prior to the time of writing from the Compliance Actions and Activities section of the FDA’s website.<sup>1</sup> The majority of these letters could be classified into six categories: herbal remedies ( $n=21$ ),

vitamin C ( $n=12$ ), vitamin D ( $n=11$ ), colloidal silver ( $n=11$ ), cannabis and cannabis-related products ( $n=11$ ), essential oils ( $n=11$ ), and minerals ( $n=5$ ). Herbal remedies are highly diverse, contain mixtures of a variety of substances prepared in numerous ways, and contain compounds that are unspecified in the FDA letters and the websites to which they refer. Given the difficulty of evaluating such claims, the present review does not include herbal supplements, but focuses on the remaining 5 categories. The purpose of this review is to discuss the dubious claims made about these substances relating to their ability to prevent or treat SARS-CoV2 infections, and we will also consider the scientific basis for such claims.

## 2. Colloidal silver

Colloidal silver has been offered as a treatment for numerous illnesses for decades and is currently advertised for use to prevent or treat COVID-19. Claims range from immune-boosting properties and direct antiviral properties. Some even claim that nebulized colloidal silver has historically been used to treat lung problems, including asthma, chronic lung diseases, and bronchitis. Prior to the advent of modern antibiotics, colloidal silver was used as a surgical disinfectant,<sup>5-7</sup> but we were unable to find a single study

justifying any of the other claims above. When a guest, Sherrill Sellman, claimed colloidal silver kills and deactivates coronaviruses on the Jim Bakker show, the FDA promptly sent a warning letter, and the state of Missouri sued Bakker and his production company.<sup>8</sup> However, Walmart continues to sell a colloidal silver product that claims to “Eliminate toxins in the body and recover up to fifty percent faster from injury, stress and strenuous exercise while keeping the body free of toxins, viruses, and harmful bacteria.”<sup>9</sup> Why are Walmart and the manufacturers of this product not included in FDA letters? The claims on Walmart’s website are very similar to those of Sellman’s, and a 2015 publication even warned about the dangers of the claims of this very product.<sup>10</sup>

### **3. *Cannabis and related products***

In spite of five FDA warning letters to cannabis producers, the top four links of a Google search of “coronavirus CBD” suggest that cannabinoids are safe or have plausible benefit for patients intending to prevent or treat COVID-19. In these four links alone, one can find claims that cannabinoids have immune-boosting properties, open the airway, are anti-bacterial, mitigate cytokine storms, reduce anxiety, or alleviate aches and pains. Numerous vendors were targeted by the FDA

or local authorities for claims that cannabinoids are effective for treating airway inflammation resulting from COVID-19.<sup>11, 12</sup> Yet, after receiving an FDA warning letter, the Facebook Page of Neuro XPF *still* claims “cannabinoids can boost your immune system and protect you from any virus known to man.” Are FDA warning letters enforced?

There are currently no published clinical trials of CBD for the treatment of respiratory tract infections, immune response, cytokine storm, or airway symptoms. Two studies demonstrate tetrahydrocannabinol (THC) or delta-1-THC have no effect on airway function.<sup>13, 14</sup> Two studies suggest delta-9-THC causes bronchodilation commensurate with irritation of the airway, or even severe bronchoconstriction, making it unsuitable for therapeutic use.<sup>15-17</sup> Smoking cannabis can even result in aspergillus infections, particularly in immunocompromised individuals who are most susceptible to COVID-19.<sup>18, 19</sup> The claims of these vendors stand in stark contrast with the paucity of clinical studies and the strong clinical evidence that cannabinoids may cause adverse effects.

### **4. *Essential oils***

Purveyors of essential oils or herbs are also highly represented in COVID-19 warning

letters. One such company suggests that inhaling these oils is the "...magic key to help keep your immune system strong and less likely to succumb to illness." Oil vendors also claim that oils have antiviral properties that kill viruses before and that they sell "antiviral essential oils" taken via steam inhalation, nasal sprays, and swabs. A single study has evaluated an oral formulation of essential oils obtained from three herbs – thyme or Spanish oregano, dittany, and sage – in a randomized cohort of patients with upper respiratory tract infections. The study found no association with disease outcome.<sup>20</sup> Several studies of local administration of EOs have been conducted, finding that EOs are sometimes useful to treat the symptoms of cough; however, these trials do not demonstrate any potential for immune support or direct antiviral properties.<sup>21</sup> Thus, while several studies have examined the direct antimicrobial activities of essential oils, clinical evidence of efficacy is lacking. Yet, even major retailer GNC, in a video entitled "A Message From GNC On COVID-19," suggests that echinacea can support one's "natural resistance." How can EO sellers claim their products have any immune benefits, let alone the potential to treat infection?

## 5. *Vitamins and minerals*

Several FDA warning letter recipients claim mixtures of vitamins and minerals can prevent or treat SARS-CoV2. One company suggests that 200mg vitamin C, 50-75ng/mL vitamin D, zinc, and selenium are "4 key nutrients for coronavirus," and links to their website in which these products are directly sold to consumers. We easily found more companies advertising similar remedies on the internet and social media. For instance, clinics offering intravenous (IV) hydration therapies for immune support are ubiquitous. Typically, these clinics mix fluids, electrolytes, various vitamins (especially vitamin C), and zinc. For an upcharge, the bag will also include pain relievers, anti-nausea medications, magnesium, glutathione, and other vitamins. One such clinic claims to be open during the COVID19 pandemic, "...to boost your immune system through preventative care and to keep healthy people well." Another claim, "All patients who received intravenous vitamin C improved and there was no mortality" from COVID-19. Why haven't these businesses received FDA warning letters?

A meta-analysis of numerous interventional trials demonstrates that vitamin C is not considered an effective therapy for the prevention or treatment of viral infections in

general.<sup>22</sup> Only 11 clinical trials are available on PubMed under the heading of “vitamin C” supplement immune,” most of which are devoted to immune changes that occur in trained athletes or individuals with rare diseases. Only three of these studies appear to test whether vitamin C supplementation generally improves immune function, and each of those is negative.<sup>23-25</sup> There are currently four clinical trials available on PubMed in which vitamin D supplementation was tested for the treatment of cold duration or severity.<sup>26-29</sup> Only one study suggests vitamin D may reduce the disease burden of respiratory tract infections in patients who harbor rare antibody deficiencies;<sup>27</sup> the rest were negative. We found 73 clinical studies pertaining to vitamin D and immunity. The majority of these studies were in very specialized populations, although vitamin D did affect various measures of immune function with little relevance to cold or flu prevention.<sup>30-32</sup> Several clinical trials suggest zinc lozenges may shorten the duration of colds; however, most lozenges on the market have low doses of zinc, contain substances that bind zinc, or have inappropriate counterions, limiting the efficacy of over-the-counter formulations.<sup>33,34</sup> Lastly, no study has evaluated selenium monotherapy for respiratory tract infections, and mixed results

were observed in those testing selenium supplements combined with other nutrients.<sup>35,36</sup> The lack of evidence for vitamin or mineral used for cold treatment or prevention has already led to large settlements for OTC supplement manufacturers who suggested these are cold remedies.<sup>37,38</sup> Why are so many still claiming that vitamins are useful for preventing or treating viral infections?

## 6. Conclusion

The incidence of false or misleading claims pertaining to self-care products appears to be increasing, while current efforts to mitigate medical misinformation are highly limited.<sup>39,40</sup> Public trust in medicine is at least a function of a marketplace that continues to provide false hope for patients on an enormous scale.<sup>40</sup> The current system has been insufficient to suppress the false, misleading, and profit-motivated efforts of those who exploit public credulity, particularly during times of public health crises. The medical community must vocally and clearly oppose such quackery, or significant medical *caveat emptor* will not stop surfacing.

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