THE LEADING ROLE OF VITAMIN C AND ITS PHARMACOLOGICAL REPOSITIONING DURING THE COVID-19 PERIOD: SCIENTIFIC EVIDENCE versus FAKE NEWS

https://doi.org/10.63330/aurumpub.044-021

Railson Pereira Souza[1], Jorgiana Araújo Libânio[2], Kauan Ferreira da Rocha[3], Renata Sales Abreu Formiga[4], Ianne Fernandes da Silva[5], Vanessa Maria Oliveira Viana[6], Antonio Jalson Cardoso Magalhães[7], Vanessa Barros Trindade Lima Fernandes[8], Crislane de Moura Costa[9], Marilene Magalhães de Brito[10] and Paulo Victor de Lima Sousa[11]

Abstract

The present study addresses the analysis of the quality of scientific evidence related to the pharmacological leading role of vitamin C and its repositioning in the context of COVID-19, in the face of the dissemination of misinformation in digital environments. This is a bibliographic review whose

[1] Doctoral student in Pharmacology – Graduate Program in Pharmacology – PPGFARM/UFPI
E-mail: railson.ali@hotmail.com
ORCID: https://orcid.org/0000-0002-2996-4511
[2] Master's degree in Food and Nutrition – Graduate Program in Food and Nutrition – PPGAN/UFPI
E-mail: jorgiana29@hotmail.com
ORCID: https://orcid.org/0000-0003-1021-497X
[3] Master's student in Pharmacology – PPGFARM/UFPI
E-mail: kauanrch56@gmail.com
ORCID: https://orcid.org/0009-0006-7517-7611
[4] Specialist in Family Health – UNIPÓS
E-mail: wrenataw@hotmail.com
ORCID: https://orcid.org/0000-0002-1059-3298
[5] Master's degree in Sciences and Health – Graduate Program in Sciences and Health - PPGCS/UFPI
E-mail: iannefernandesdasilva@gmail.com
ORCID: https://orcid.org/0009-0008-3727-3367
[6] Master's degree in Sciences and Health – PPGCS/UFPI
E-mail: vanessamaolivi@gmail.com
ORCID: https://orcid.org/0000-0002-9876-6156
[7] Specialist in Occupational Nursing - Faculdade Brasil Empreender, FABEMP
E-mail: antoniojalsoncm@gmail.com
ORCID: https://orcid.org/0009-0007-6452-1947
[8] Specialist in Urgency and Emergency Care – UNIPÓS
E-mail: vanessatrindade2489@gmail.com
ORCID: https://orcid.org/0009-0001-9341-5808
[9] Doctorate in Food and Nutrition - PPGAN/UFPI
E-mail: crislane.mc@gmail.com
ORCID: https://orcid.org/0000-0001-7189-6711
[10] Doctorate in Food and Nutrition - PPGAN/UFPI
E-mail: marilene_mmb@hotmail.com
ORCID: https://orcid.org/0000-0001-7603-5136
[11] Doctorate in Food and Nutrition - PPGAN/UFPI
E-mail: paulovictor.lima@ufpi.edu.br
ORCID: https://orcid.org/0000-0003-1486-0661

objective was to critically evaluate the therapeutic role of ascorbic acid, as well as to confront unsupported information widely disseminated during the pandemic. The methodology was based on the search for and analysis of scientific articles, clinical trials, and technical documents available in databases such as PubMed, Web of Science, ScienceDirect, and Embase, as well as preprint repositories and clinical study registries. The results show that vitamin C has relevant antioxidant, anti-inflammatory, and immunomodulatory properties and may act as adjuvant therapy in patients with severe conditions, especially in reducing hospitalization time and improving clinical parameters. However, it was observed that the evidence remains inconclusive regarding its isolated efficacy in the treatment of COVID-19, especially due to the heterogeneity of the studies and the lack of definition of ideal doses. Furthermore, the widespread dissemination of false information associating vitamin C with curing the disease was identified, which may compromise evidence-based prevention measures. It is concluded that, although promising, the use of vitamin C should be guided by robust scientific evidence, and the strengthening of health education strategies is essential for confronting misinformation.

Keywords: Vitamin C, COVID-19, Drug repositioning, Fake news, Health education.

INTRODUCTION

Vitamin C, also called an antiscorbutic, consists of an indispensable dietary micronutrient that is crucial for maintaining organic processes (Verma et al., 2026). According to its redox state, it can be found in the following forms: reduced, called ascorbic acid (AA), and oxidized, called dehydroascorbic acid (DHA), influencing its antioxidant properties (under physiological conditions), pro-oxidant properties (in pathological states), anti-inflammatory, antiviral, and immunostimulatory properties (Yun et al., 2015; Macan; Kraljević; Raić-Malić, 2019; Banna et al., 2019; Chanphai; Tajmir-Riahi, 2019; Ravindran et al., 2019; Alberts et al., 2025).

Vitamin C is widely found in fresh fruits and vegetables, and may also be present in a range of oral supplements, such as tablets (conventional, chewable, and effervescent), capsules, crystalline

powders, effervescent lozenges, gummy candies, liquids, as well as intravenous (IV) administration, which has been well tolerated in clinical trials (Vannucchi; Rocha, 2012; Boretti; Banik, 2020; Verma et al., 2026).

Due to its antioxidant action, vitamin C, especially in the form of AA, has been extensively investigated as a possible agent in the prevention and treatment of the disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (Qin et al., 2025). Although scientific evidence does not show that vitamin C intake translates into a significant benefit in the treatment of respiratory infections, its activity in critically ill patients, mediated by several mechanisms, has also already been proposed. Thus, research addressing the action of vitamin C specifically for COVID-19 would add valuable information (Gómez et al., 2018; Hemilä; Chalker, 2019; Carr, 2020).

Alongside the COVID-19 pandemic, the world is also facing an “infodemic” of low-credibility information regarding COVID-19. Several news websites contribute to the publication of false information, known as Fake News, about the novel coronavirus, which may lead the population to believe in such information and even in a supposed cure for the disease, resulting in a greater number of infected people, in addition to inhibiting effective actions for protection against the virus (Chen; Guestrin, 2016; Chen; Lerman; Ferrara, 2020; Dong; Du; Gardner, 2020; Silva et al., 2023).

Currently, there are vaccines with proven efficacy in preventing COVID-19, as well as pharmacological therapies used in the management of the disease (Ma et al., 2025); however, the search for more effective and specific treatments remains in constant development. A widely employed strategy today is drug repositioning, which consists of using therapeutic agents previously approved for certain clinical conditions, redirecting them as potential antiviral agents in the treatment of the disease in question (Pushpakom et al., 2018; Neuberger et al., 2019; Li et al., 2020; Maxmen, 2020; Singh et al., 2025).

In this context, the present study aims to analyze the repositioning of vitamin C as a potential therapeutic agent in COVID-19, with emphasis on the available scientific evidence and on the refutation of false information disseminated on the subject.

This was a bibliographic review study, carried out with scientific articles, editorials, preprints, and documents in general, with a time frame between 2016 and 2026, available in databases (ScienceDirect, Embase, Web of Science, and PubMed), reliable repositories (medRxiv and bioRxiv), as well as websites of trustworthy scientific entities. Additionally, due to the limited number of published studies on the topic, a search was conducted in ClinicalTrials.gov and in the Brazilian Registry of Clinical Trials (ReBEC), using the terms “Covid-19” and “ascorbic acid,” or their equivalents in Portuguese, retrieved up to July 2020.

Records of ongoing studies were selected whose protocol included at least one group of patients receiving oral and/or intravenous supplementation with ascorbic acid as prophylaxis, monotherapy, and adjuvant therapy for COVID-19. For the selection of bibliographic materials, titles and abstracts related to the topic were used as inclusion criteria. The bibliography was analyzed and selected, and the subjects were segmented into topics for better comprehension and understanding.

SARS-COV-2 AND COVID-19: SHALL WE LEARN ABOUT THEM?

At the end of the last decade, the World Health Organization (WHO) was first notified of an outbreak of pneumonia in Wuhan, Hubei Province (China), a city with 11 million inhabitants. On March 12, 2020, 125,048 cases and 4,614 deaths (nearly 3.7% of cases) were reported for the new virus (WHO, 2020a), then called novel coronavirus-2019 (2019-nCoV) and later renamed SARS-CoV-2 (Perrella et al., 2020).

The WHO named this new disease COVID-19 and, on March 11, 2020, characterized it as a pandemic (WHO, 2020b; Perrella et al., 2020). Three months after the emergence of the new virus, almost half a million cases of infection had been identified in 197 countries and, almost six months later,

the total number of infected people worldwide was 7,273,958, with 413,372 confirmed deaths (Dong; Du; Gardner, 2020; WHO, 2020c).

SARS-CoV-2 is an enveloped RNA virus of the genus Betacoronavirus, which is distributed among birds, humans, and other mammals (Del Rio; Malani, 2020; Zhu et al., 2020; Oh et al., 2025). Compared to other coronaviruses, it is closest to two strains of the SARS virus (bat-SL-CoVZC45 and bat-SL-CoVZXC21) found among bats in Zhoushan, Zhejiang Province, China, in 2018 (Lu et al., 2020).

It is noteworthy that two thirds of the first 41 confirmed cases of COVID-19 in China were related to the Huanan Seafood Wholesale Market (in Wuhan), where live animals were sold, and the modes of person-to-person transmission, through droplets, fecal-oral route, and conjunctiva, subsequently led to many cases worldwide (Xu et al., 2020; Dong; Du; Gardner, 2020; Lu et al., 2020; Li et al., 2020).

Patients with COVID-19 may be asymptomatic or present various clinical manifestations, including acute symptoms such as fever, fatigue, headache, sore throat, dry cough, anosmia, dyspnea, and diarrhea; pneumonia presenting as acute respiratory distress syndrome (ARDS); as well as multiple organ failure (Guarienti et al., 2024). According to data published in China, 80% of patients with COVID-19 developed mild symptoms, 15% had a severe course, and fewer than 5% had a critical course accompanied by sepsis and multiple organ failure (Huang et al., 2020; Chen et al., 2020; Wang et al., 2020; Zhou et al., 2020).

Currently, although effective vaccines and specific therapies exist for the management of COVID-19, there is no single and definitive regimen applicable to all cases. Thus, preventive measures remain fundamental, including the adoption of good hygiene practices, well-ventilated environments, and general health care, which remain important strategies for reducing disease transmission (von Agris et al., 2025). Among the preventive measures, the following stand out: washing hands for at least 20 seconds, using soap or disinfectant with at least 60 to 80% alcohol; avoiding touching the facial T-zone (eyes, nose, mouth); avoiding contact with symptomatic people, or at least maintaining distance from them; avoiding crowds and travel to outbreak areas; sterilizing frequently handled surfaces and using full personal

protective equipment (PPE) (surgical masks, double gloves, procedure gowns with full sleeves, and eye protection) for health professionals (Wu et al., 2020; von Agris et al., 2025).

THE DRUG REPOSITIONING STRATEGY IN THE TREATMENT OF INFECTIOUS DISEASES

Drug repositioning has recently emerged as an alternative for the faster identification of effective treatments against infectious diseases and has gained prominence because it is an essential and universal strategy in the therapeutics of some diseases due to factors such as: 1) lower costs and shorter time to market; 2) existing pharmaceutical supply chains are available for formulation and distribution; 3) possibility of combination with other drugs in treatments more effective than monotherapy; and 4) enabling the discovery of new mechanisms of action for previously approved drugs (Mercorelli et al., 2018; Pushpakom et al., 2018; Augustin et al., 2023). This strategy also has limitations, including patent barriers, complexity of regulatory pathways, lack of funding opportunities, greater access to data from other industry-sponsored clinical trials, and population heterogeneity for new clinical studies (Akodad et al., 2026). Nevertheless, this strategy still represents a promising approach for identifying new pharmacological classes with innovative potential (Pushpakom et al., 2018; Neuberger; Oraiopoulos; Drakeman, 2019; Akodad et al., 2026).

With regard to the treatment of COVID-19, all available therapeutic resources and drugs have been redirected based on patients' symptomatic conditions. Considering Acute Respiratory Distress Syndrome (ARDS), followed by secondary infections, some antibiotics, antivirals, systemic corticosteroids, and anti-inflammatory agents are frequently being used in COVID-19 treatment regimens; in addition to neuraminidase inhibitors, RNA synthesis inhibitors, convalescent plasma, and traditional herbal medicines (Lu, 2020).

In the investigation by Rosa and Santos (2020), 24 clinical trials on drug repositioning in the treatment of COVID-19 were identified. The pharmaceutical interventions found included: human

immunoglobulin, interferons, hydroxychloroquine/chloroquine, azithromycin, arbidol, remdesivir, oseltamivir, favipiravir, carrimycin, methylprednisolone, bevacizumab, thalidomide, vitamin C, pirfenidone, bromhexine, fingolimod, danoprevir, ritonavir, darunavir, cobicistat, and lopinavir.

SCIENTIFIC EVIDENCE ON THE REPOSITIONING OF VITAMIN C IN THE TREATMENT OF COVID-19: EXTRA, SUPPORTING ACTOR, OR PROTAGONIST?

Vitamin C is a water-soluble micronutrient, an essential cofactor in numerous enzymatic reactions that mediates a variety of important biological functions, as it has immunomodulatory effects, anti-inflammatory and antiviral properties, and possible antimutagenic effects, with one of its main activities being antioxidant action, through the direct neutralization of reactive oxygen species (ROS), a fundamental action in defense against the toxicity of these molecules and in maintaining cellular redox status (Combs; McClung, 2017; Dennis; Witting, 2017; Hernández et al., 2020; Alberts et al., 2025).

Vitamin C, in the form of AA, is an electron donor and therefore a reducing agent that combats excess free radicals in cells, which reiterates its antioxidant action (Dennis; Witting, 2017). Recently, vitamin C has been investigated as an effective, accessible, and safe therapeutic alternative. It is estimated that its use may promote improved functioning of the immune system through several mechanisms, including increased phagocytic and lymphocytic activity (Baladia et al., 2020).

Van Gorkom et al. (2018) showed that vitamin C positively affects the development and maturation of T lymphocytes and natural killer (NK) cells, which are involved in the immune response to viral agents. This micronutrient also contributes to the inhibition of reactive oxygen species (ROS) and prevents the production and remodeling of the cytokine network, characteristic of systemic inflammatory syndrome.

In a more recent study, the authors revealed that high-dose intravenous vitamin C (HDIVC) is frequently being used in the adjuvant treatment of a variety of pathological conditions, such as sepsis, sepsis-induced acute lung injury, cancer, and burns. However, despite all the benefits, in the case of

supplementation with excessive doses of AA, there may be a transition from a healthy state to a pathological one, triggering pro-oxidant activity. Furthermore, the optimal dose to be ingested and the threshold between a beneficial and harmful dose are debatable (Santos et al., 2019).

Thus, despite all the cited benefits of vitamin C, mainly due to its antioxidant action, it has been strongly associated with the prevention and treatment of COVID-19; for this reason, studies are being conducted in search of scientific evidence that proves or disproves such advantages (ClinicalTrials.Gov, 2020a; Kashiouris et al., 2020).

Because of this information, a phase II clinical trial (NCT04264533) was initiated in China to evaluate HDIVC in ICU patients with severe pneumonia associated with COVID-19 (Medicine USNLO, 2020). Some hospitals reported giving infected patients 1500 mg of vitamin C as supportive treatment. However, in China, HDIVC was administered at doses between 2 and 10 g/day in the treatment of 50 patients with severe COVID-19, over a period of 8 to 10 hours per infusion. The result was that the oxygenation index improved in real time and all patients eventually recovered and were discharged (Cheng, 2020; National Cancer Institute, 2020).

In the literature, to date, only one study has evaluated the effects of vitamin C on COVID-19 and found that intravenous AA (100 mg/kg/day) for 7 days reduced the length of hospitalization in the group with moderate SARS-CoV-2 infection (Anderson, 2020). However, it is important to consider the study's small sample size; therefore, further research is needed.

On the other hand, this evidence may be supported by recent meta-analyses with severely ill patients with other diseases, in which vitamin C administration reduced ICU length of stay by 7.8% (Hemilä; Chalker, 2019), mechanical ventilation time, and the need for vasopressor medications (Wang et al., 2019).

According to **Table 1**, ongoing studies are using an oral dose of 250 to 500 mg/day of ascorbic acid as prophylaxis against COVID-19. Intravenous AA at a dose of 8 to 10 g/day is being used as

adjuvant therapy to standard drug treatment in hospitalized patients. The results of these studies are important for the future direction of COVID-19 treatment.

Table 1

Studies registered on ClinicalTrials.gov on vitamin C therapy and COVID-19.

ClinicalTrials Identifier	Country	Estimated General Population	Type of Therapy	Vitamin C Dose	Primary Outcome	Estimated Primary Completion
NCT04446104	Singapore	5000 adult male individuals at risk of COVID-19	Prophylaxis	500 mg/day for 42 days (control group)	COVID-19 diagnosis	July/2020
NCT04328961	United States	2000 individuals > 18 years old, both sexes, at risk of COVID-19	Prophylaxis	500 mg of ascorbic acid for 3 days and 250 mg for 11 days (oral route) (control group)	COVID-19 diagnosis	September/2020
NCT04357782	United States	20 hospitalized patients > 18 years old, both sexes, with sepsis including due to SARS-CoV-2	Monotherapy	200 mg/kg/day of intravenous ascorbic acid for 4 days	Adverse events	June/2020
NCT04264533	China	140 hospitalized patients > 18 years old, both sexes, with SARS-CoV-2 pneumonia	Monotherapy	24 g of intravenous ascorbic acid/day for 7 days	Ventilator-free days (up to 28 days)	September/2020
NCT03680274	Canadá	800 hospitalized patients > 18 years old, both sexes, with sepsis including due to SARS-CoV-2	Monotherapy	200 mg/kg/day of intravenous ascorbic acid for 4 days	Mortality or organ dysfunction (up to 28 days)	December/2021
NCT04342728	United States	520 outpatients > 18 years old, both sexes, diagnosed with COVID-19	Adjuvant	8000 mg of ascorbic acid/day for 10 days (group A)	Symptom reduction (up to 28 days)	December/2020
NCT04323514	Italy	500 hospitalized patients (children, adults, and elderly people), both sexes, with SARS-CoV-2 pneumonia	Adjuvant	10 g of intravenous ascorbic acid/day	In-hospital mortality (up to 3 days)	March/2021

In the study by Bharara et al. (2016), 50 mg/kg of IVAA was administered every 6 hours for 96 hours to treat recurrent ARDS, with satisfactory results and no side effects detected. In another investigation in which HDIVC was administered to patients with severe pneumonia, it was observed that those treated with vitamin C had significantly lower in-hospital mortality. Clinical investigations conducted at Virginia Commonwealth University revealed that high plasma levels of vitamin C act “pleiotropically” to attenuate systemic inflammation and correct sepsis-induced coagulation abnormalities while mitigating vascular injury (CITRIS-ALI clinical trial; identifier NCT02106975). These critically ill

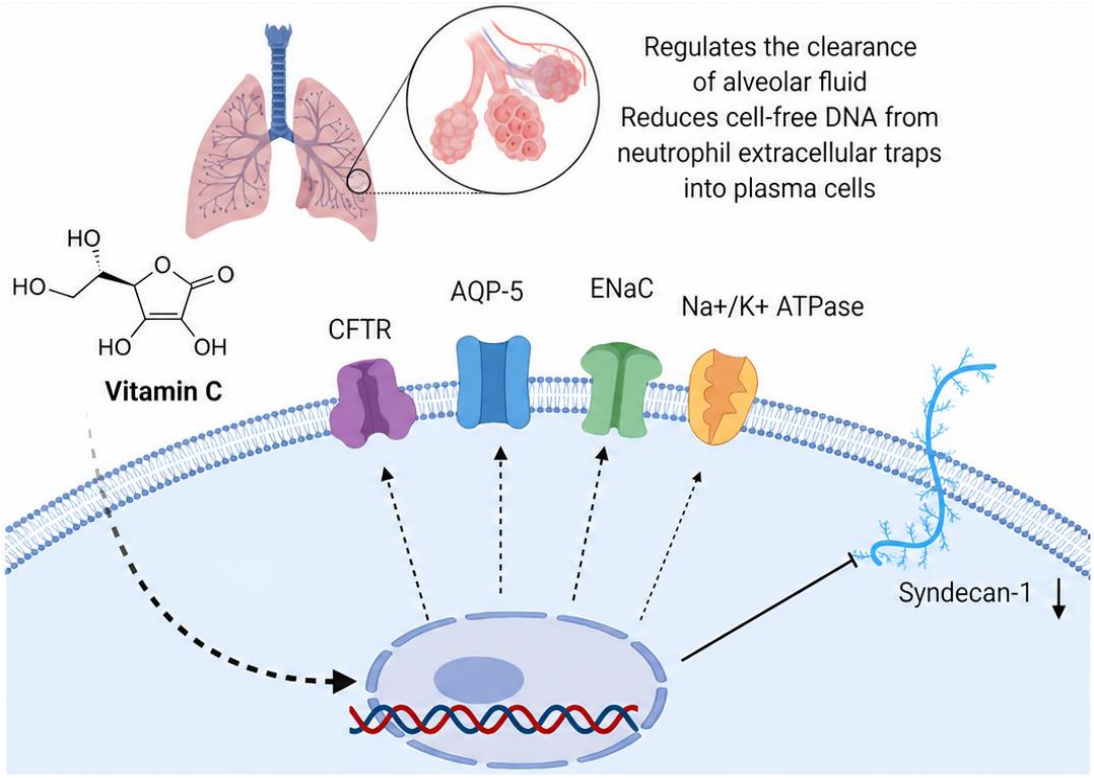
patients generally have a reduced concentration of antioxidants. Therefore, a positive effect of vitamin C may be expected (Kim et al., 2018; ClinicalTrials.gov, 2020b).

Thus, to treat pneumonia and hyperinflammation caused by COVID-19, vitamin C should be administered in high doses. Several protocols have recently emerged with different doses and frequencies of administration. The issue is that there is controversy regarding the pro-oxidant effect of vitamin C at high doses, as it has not been demonstrated in vivo, nor is it known at what dose this may occur. Cytokine accumulation generates ROS that can be effectively treated with doses of 30 to 60 g of vitamin C, and at the same time, the relatively high level of vitamin C may promote enhanced chemotaxis of white blood cells (neutrophils, macrophages, lymphocytes, B cells, NK cells) (Hernández et al., 2020; Zeng et al., 2023).

Vitamin C reinforces the maintenance of the alveolar epithelial barrier and increases the transcription of protein channels (transmembrane conductance regulator – CFTR, aquaporin-5 – AQP-5, epithelial sodium channel – ENaC, and sodium-potassium pump – Na^+/K^+ ATPase) that regulate alveolar fluid clearance (Hook; Kuebler, 2025). The use of HDIVC has been implicated in reducing plasma cell-free DNA formed from neutrophil extracellular traps (NETs), which facilitate systemic inflammation in sepsis-induced multiple organ failure. Interestingly, elevated plasma levels of syndecan-1 correlate with increased mortality in severe sepsis and ARDS, and this endothelial proteoglycan can be significantly reduced by HDIVC (**Figure 1**) (Bendib et al., 2019; Kashiouris et al., 2020).

Figure 1

Action of Vitamin C in reducing mortality rates in patients with severe sepsis and ARDS.



Source: Authors

Due to the lack of evidence against COVID-19, recommendations for vitamin C intake are limited; although, previously, doses of 1–2 g/day were considered effective in preventing upper respiratory infections. Since these levels are not attainable through dietary sources, supplementation may be recommended for those at higher risk of respiratory infections. However, doses above 200 mg/day may not benefit healthy individuals; therefore, further research is being developed to prove or disprove the benefits of its use against COVID-19 (Zabetakis et al., 2020).

Taking into account the studies already completed and the progress of those still underway, vitamin C may bring benefits in the treatment of COVID-19; however, uncertainty regarding the vitamin dosage, its form of use, and also its pro-oxidant effect, which may appear at high doses, means that it cannot be stated that vitamin C is conclusively a safe and effective nutrient in combating the current pandemic.

FAKE NEWS, COVID-19, AND VITAMIN C

At present, the amount of information available in the media has increased dramatically, especially in the last ten years, due to the informational explosion "in which information proliferates and circulates in vast quantity and at great speed." With this high level of information available in the digital environment, there is the problem caused by the high production of false news, better known by the term Fake News, and consequently, an increase in misinformation in digital media (Brisola; Romeiro, 2018; Carvalho; Mateus, 2018; Giotakos, 2022).

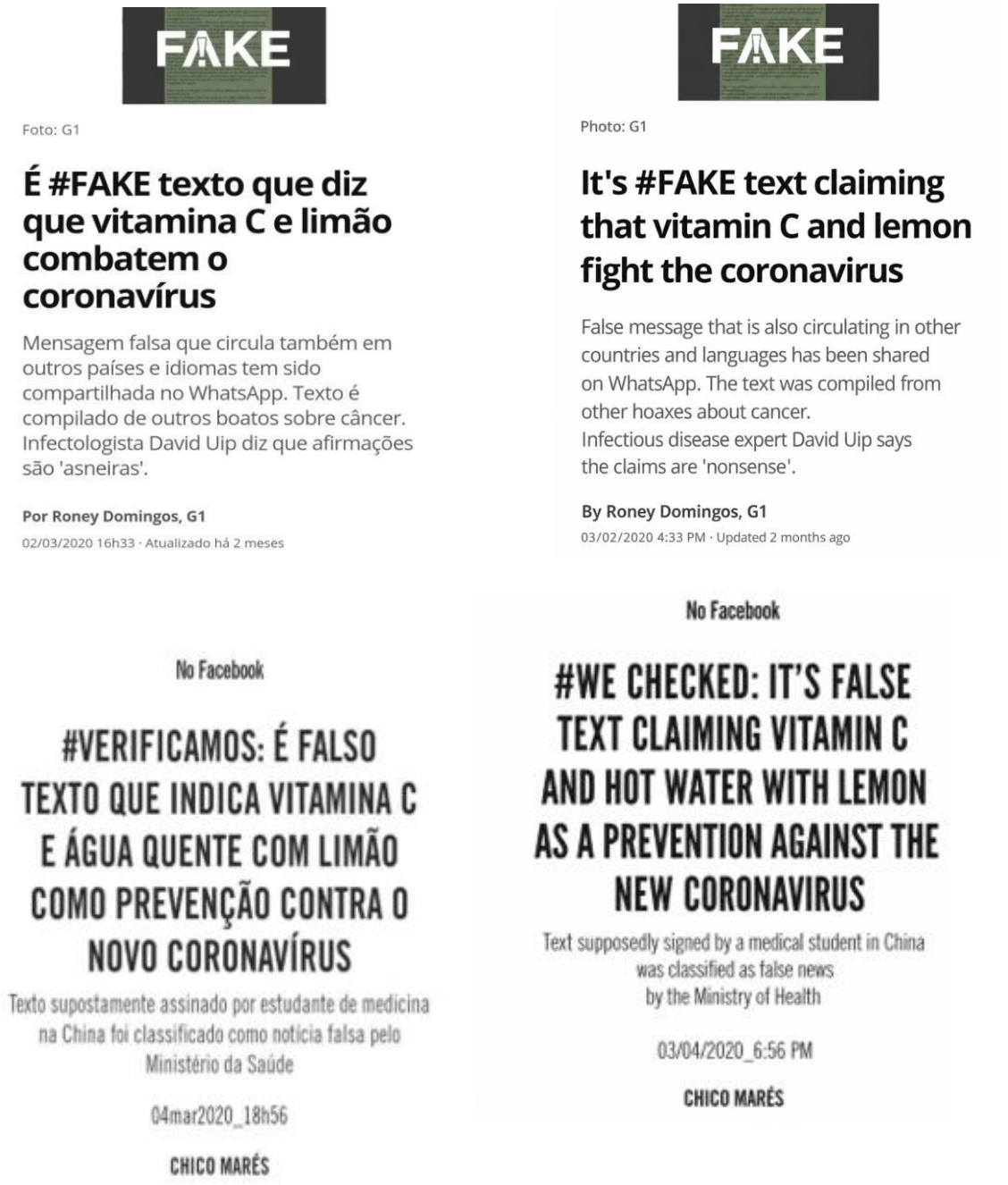
As the SARS-CoV-2 virus spread around the world, a flood of false medical information, rumors, and conspiracy theories unsupported by unfiltered channels has been disseminated, frequently spread through social media and other means of communication (Farhoudinia; Ozturkcan; Kasap, 2024). This infodemic process, which can be defined as an excessive amount of information about a problem, such that the solution becomes more difficult, has become a serious public health problem. In such a rapidly changing situation, with millions of people isolated at home, social media platforms such as Twitter, Facebook, WhatsApp, Instagram, and WeChat have become major sources of (mis)information (Hollowood; Mostrous, 2020; Lai et al., 2020).

For this reason, some institutions, agencies, and fact-checking websites can help examine the reality of news or information, and they are working to combat misinformation and promote facts about COVID-19 disease (UN News, 2020). The Brazilian Ministry of Health, as a way of confronting Fake News about health, has provided a WhatsApp number for receiving messages from the population, an exclusive space to receive viral information, which is verified by technical areas and officially answered as true or false, in a tab on the agency's official page for viewing only Fake News (Brasil, 2020).

Among the various Fake News items circulated during the novel coronavirus pandemic, vitamin C has been involved in many of them, some of which are shown in **Figure 2** and have also already been debunked and clarified.

Figure 2

Images of Fake News related to Vitamin C and COVID-19.



Source: Authors. Original version on the left; translated version on the right for clarity.

According to the news items presented in Figure 2 above, it can be observed that it is highly imperative to state that vitamin C, in the form of a simple infusion combined with water and other substances, is capable of preventing or even having an effective action against the novel coronavirus. Thus, it becomes vital to educate the general population about the nature of false news and the negative outcomes of sharing it, because this creates a false feeling in people's minds, making them think they are protected from the disease and promoting greater transmission of it.

FINAL CONSIDERATIONS

Based on all the research carried out regarding the repositioning of Vitamin C for the prevention and/or treatment of COVID-19, it was found that it may present several benefits to the human organism, mainly with regard to its antioxidant potential and its ability to improve immune system functioning, being studied and used as a therapeutic alternative in conditions related to respiratory syndromes, especially in the treatment of COVID-19.

Some studies using HDIVC have shown improvement in reducing hospitalization time and even optimizing oxygenation levels. However, it cannot be stated with complete certainty that it is an effective

nutrient against COVID-19, because the data are still uncertain, since the real side effects of its use and the ideal doses to be administered to each individual are still unknown. Therefore, further research advancing on the subject is needed, as is awaiting the studies that are being developed and previously initiated.

REFERENCES

AKODAD, S. et al. Impact of drug repurposing between 1985 and 2024 on pharmaceutical innovation. **Communications Medicine**, v. 6, n. 1, p. 84, 2026.

ALBERTS, A. et al. Vitamin C: a comprehensive review of its role in health, disease prevention, and therapeutic potential. ***Molecules***, v. 30, n. 3, p. 748, 2025.

ANDERSON, O. S. Intravenous ascorbic acid for supportive treatment in hospitalized COVID-19 patients. ***Journal of Orthomolecular Medicine***, v. 35, n. 1, p. 1–3, 2020.

AUGUSTIN, Y. et al. Drug repurposing for COVID-19: current evidence from randomized controlled adaptive platform trials and living systematic reviews. ***British Medical Bulletin***, v. 147, n. 1, p. 31–49, 2023.

BALADIA, E. et al. Vitamin C for the treatment of COVID-19: a living systematic review. ***Medwave***, v. 20, n. 6, e978, 2020.

BENDIB, I. et al. Neutrophil extracellular traps are elevated in patients with pneumonia-related acute respiratory distress syndrome. ***Anesthesiology***, v. 130, n. 4, p. 581–591, 2019.

BHARARA, A. et al. Intravenous vitamin C administered as adjunctive therapy for recurrent acute respiratory distress syndrome. ***Case Reports in Critical Care***, v. 2016, p. 8560871, 2016.

BORETTI, A.; BANIK, B. K. Intravenous vitamin C for reduction of cytokine storm in acute respiratory distress syndrome. ***PharmaNutrition***, v. 12, p. 100190, 2020.

BRASIL. Ministério da Saúde. Saúde sem fake news. 2020. Disponível em: https://www.saude.gov.br/fakenews. Acesso em: 06 jul. 2020.

BRISOLA, A. C.; ROMEIRO, N. L. A competência crítica em informação como resistência. **Revista Brasileira de Biblioteconomia e Documentação**, São Paulo, 2018.

CARR, A. C. A new clinical trial to test high-dose vitamin C in patients with COVID-19. **Critical Care**, v. 24, n. 1, 2020.

CARVALHO, M. F. C.; MATEUS, C. A. Fake news e desinformação no meio digital. **Múltiplos Olhares em Ciência da Informação**, 2018.

CHEN, E.; LERMAN, K.; FERRARA, E. Tracking social media discourse about the COVID-19 pandemic. ***JMIR Public Health and Surveillance***, v. 6, n. 2, 2020.

CHEN, N. et al. Epidemiological and clinical characteristics of COVID-19. ***The Lancet***, v. 395, p. 507–513, 2020.

CHEN, T.; GUESTRIN, C. XGBoost: a scalable tree boosting system. In: **Proceedings of the 22nd ACM SIGKDD Conference**, 2016. p. 785–794.

CHENG, R. Can early and high intravenous dose of vitamin C prevent COVID-19? ***Medicine in Drug Discovery***, p. 100028, 2020.

COMBS, G. F.; MCCLUNG, J. P. Vitamin C. In: **The Vitamins**. 5. ed. Academic Press, 2017. p. 267–295.

DEL RIO, C.; MALANI, P. N. 2019 novel coronavirus—important information for clinicians. ***JAMA***, 2020.

DENNIS, J. M.; WITTING, P. K. Papel protetor dos antioxidantes. ***Nutrients***, v. 9, p. E718, 2017.

DONG, E.; DU, H.; GARDNER, L. An interactive dashboard to track COVID-19. **The Lancet Infectious Diseases,** v. 20, n. 5, 2020.

FARHOUDINIA, B.; OZTURKCAN, S.; KASAP, N. Emotions unveiled: detecting COVID-19 fake news. **Humanities and Social Sciences Communications**, v. 11, p. 640, 2024.

GIOTAKOS, O. Fake news in the age of COVID-19. **Psychiatriki**, v. 33, n. 3, p. 183–186, 2022.

GÓMEZ, E. et al. Does vitamin C prevent the common cold? **Medwave**, v. 18, n. 4, 2018.

GUARIENTI, F. A. et al. COVID-19: a multi-organ perspective. **Frontiers in Cellular and Infection Microbiology**, v. 14, 2024.

HEMILÄ, H.; CHALKER, E. Vitamin C can shorten ICU stay. **Nutrients**, v. 11, p. 708, 2019.

HOOK, J. L.; KUEBLER, W. M. CFTR as a therapeutic target. **American Journal of Physiology**, v. 328, n. 2, p. L229–L238, 2025.

HUANG, C. et al. Clinical features of COVID-19. **The Lancet**, v. 395, p. 497–506, 2020.

KASHIOURIS, M. G. et al. Vitamin C as treatment for sepsis. **Nutrients**, v. 12, p. 292, 2020.

KIM, W. Y. et al. Vitamin C, hydrocortisone and thiamine therapy. **Journal of Critical Care**, v. 47, p. 211–218, 2018.

LAI, C. C. et al. SARS-CoV-2 and COVID-19. **International Journal of Antimicrobial Agents**, v. 55, 2020.

LI, Q. et al. Early transmission dynamics of COVID-19. **New England Journal of Medicine**, v. 382, p. 1199–1207, 2020.

LU, H. Drug treatment options for COVID-19. *Bioscience Trends*, v. 14, n. 1, p. 69–71, 2020.

MA, K. C. et al. Estimated effectiveness of COVID-19 vaccination. **JAMA Network Open**, v. 9, n. 2, e2557415, 2026.

MERCORELLI, B. et al. Drug repurposing for viral diseases. **Trends in Microbiology**, v. 26, n. 10, p. 865–876, 2018.

NEUBERGER, A. et al. Renovation as innovation. **Drug Discovery Today**, v. 24, n. 1, p. 1–3, 2019.

OH, D. Y. et al. SARS-CoV-2 evolution and surveillance. **Communications Medicine**, v. 5, n. 1, p. 468, 2025.

PUSHPAKOM, S. et al. Drug repurposing: progress and challenges. **Nature Reviews Drug Discovery**, v. 18, n. 1, p. 41–58, 2018.

QIN, M. et al. Effects of vitamin C supplements on COVID-19. **Nutrition Reviews**, v. 83, n. 7, p. e1406–e1420, 2025.

ROSA, S. G. V.; SANTOS, W. C. Drug repositioning for COVID-19. *Revista Panamericana de Salud Pública*, v. 44, 2020.

SILVA, G. M. et al. COVID-19 vaccination challenges. *Ciência & Saúde Coletiva*, v. 28, n. 3, p. 739–748, 2023.

SINGH, M. et al. Drug repurposing for SARS-CoV-2. *Frontiers in Pharmacology*, v. 16, 2025.

VERMA, K. et al. Vitamin C in fruits and vegetables. *Food Chemistry*, v. 505, p. 148058, 2026.

WORLD HEALTH ORGANIZATION (WHO). Coronavirus disease (COVID-19). 2020.

ZENG, Y. et al. High-dose vitamin C in sepsis. *Medicine*, v. 102, n. 42, e35648, 2023.

ZHOU, F. et al. Clinical course and mortality of COVID-19. *The Lancet*, v. 395, p. 1054–1062, 2020.

ZHU, N. et al. A novel coronavirus from patients with pneumonia. *New England Journal of Medicine*, 2020.