

Original Research

Exploring the utilization of supplements, natural products, and medications among Jordanian COVID-19 patients

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Abstract

Background: The COVID-19 pandemic has significantly impacted global health, leading individuals to explore several treatments, including pharmaceutical medications, dietary supplements, and natural products, in order to manage their symptoms. Understanding these treatment patterns is vital for public health planning and policy development. **Methods:** A cross-sectional survey was conducted from February to May 2021, to investigate the use of supplements, natural products, and medications among Jordanian COVID-19 patients, assessing the prevalence, types, and perceived effectiveness of these interventions. Data were collected using a structured questionnaire. Participants were recruited through social media. Descriptive statistics and chi-square tests were employed for data analysis through SPSS. **Results:** The study included 1,178 Jordanian individuals who had contracted COVID-19. Of the participants, 54.8% were female, and 44.9% were aged 18-25. The most commonly reported symptoms were loss of smell (63.8%), headache (63.3%), and sore muscles (59.0%). Regarding treatment, 82.4% used at least one vitamin, with vitamin C (75.8%) and zinc (59.9%) being the most used. Natural substances such as honey (36.3%) and ginger (34.6%) were also widely used among the participants. Antipyretics, especially Paracetamol (60.5%), were the most frequently used drugs. Many participants perceived these treatments as effective, with vitamin C and honey being rated as effective by 62.9% and 67.8% of users, respectively. **Conclusion:** The study highlights a high prevalence of supplement and natural product use among Jordanian COVID-19 patients. These findings provide valuable insights into patient behaviors and can inform future healthcare strategies and policy formulations in similar contexts. Understanding these patterns is essential for developing effective public health guidelines and interventions during pandemics.

Keywords: Vitamins; Dietary Supplements; Natural Products; Medications; Jordan; COVID-19

INTRODUCTION

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has resulted in significant morbidity and mortality worldwide, since its emergence in late 2019.¹ As the virus rapidly spread across the world, countries implemented several strategies to control and reduce the impact of the pandemic.² In Jordan, similar to many other countries, the pandemic has strained healthcare systems, leading individuals to seek both conventional and alternative treatment to manage COVID-19 symptoms and outcomes.³ A crucial aspect of the public health response has been comprehending and addressing how infected individuals use various treatments during the COVID-19 pandemic.⁴ This includes the use of pharmaceutical medications, dietary supplements, and natural

products.⁵ Worldwide, there has been a notable increase in the consumption of supplements such as vitamins C and D, zinc, and herbal remedies.⁶ The use of these supplements is driven by the perception that they could boost immunity and aid in the recovery from COVID-19.⁵ At the same time, conventional medications, including prescription and over-the-counter, have been employed to manage the symptoms and complications of the virus.⁷

The use of supplements, natural products, and medications among COVID-19-infected patients highlights broader trends in healthcare behaviors and attitudes toward illness management.³ Understanding these patterns is essential for public health planning, particularly in developing guidelines and policies related to pandemics and prevention strategies.⁸ The present study aims to explore the use of supplements, natural products, and medications among Jordanian COVID-19 patients. By employing a cross-sectional survey, the research aims to capture a comprehensive picture of the prevalence, types, and perceived effectiveness of these interventions among infected patients, providing valuable insights into patient behaviors and informing future healthcare strategies and policy formulations in Jordan and similar contexts.

METHODS

Study Design and Study's Participants

A cross-sectional survey design was implemented from February to May 2021, in order to assess the use of supplements,

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natural products, and medications among Jordanian COVID-19 patients.

The study enrolled individuals from Jordan who had contracted COVID-19. Recruitment primarily took place via social media platforms. The study's aim was clarified clearly to the potential participants. Furthermore, they were informed that participation in the study is entirely voluntary and will not pose a minimal risk to them. Informed consent was obtained before completing the survey. Participants were assured of the confidentiality and anonymity of their responses.

Top of Form

Top of FormSurvey Instrument

A structured questionnaire was developed for data collection. The questionnaire was reviewed by independent researchers to ensure content and face validity. The final version of the survey instrument was pre-tested on a small sample to assess clarity, comprehensibility, and to identify any potential issues with the questions.

Sample size

The sample size was calculated with a 5% margin of error, a 95% confidence level, and a presumed 50% response distribution, leading to a total of 385 participants.

Statistical Analysis

Statistical analysis was performed using SPSS version 23.0 (SPSS Inc., Chicago, IL). Descriptive statistics were used to describe the demographic characteristics of participants. Categorical variables were presented as percentages with frequencies, while continuous variables were presented as mean with standard deviation (SD).

The chi-square test was used to find associations between different categorical variables. All hypothesis testing was two-sided. A P-value of <0.05 was considered significant.

RESULTS

A total of 1,178 participants completed the study's survey, with approximately 55% of them being female. Almost 45% of the participants were aged between 18-25 (n= 529). The participants exhibited a mean Body Mass Index of 25.1 (SD= 5.1). The majority were non-smokers (n= 851). Among the study's participants, 7.9% reported allergies, 5.8% had hypertension, and 5.2% had diabetes mellitus. The detailed demographic characteristics of the study participants are listed in (Table 1).

Concerning the COVID-19 infection status, 74.1% reported that they completely recovered, while 11.1% reported the opposite. Half of the study participants reported that COVID-19 infection was transmitted to them after contacting infected individuals (n= 590), whereas 30.5% were unsure. Nearly 49% of the study participants reported that the incubation period of their COVID-19 infection was 5 days or less; however, 34.2% reported that they could not determine the incubation period (Table 2).

Table 1: Demographic characteristics of the study participants (n= 1,178)

Characteristics	% (n)
Gender	
Male	45.2 (532)
Female	54.8 (646)
Age category	
12-18 years	5.4 (64)
18-25 years	44.9 (529)
25-35 years	23.6 (278)
35-45 years	13.2 (155)
45-55 years	8.4 (99)
55-65 years	3.1 (36)
>65 years	1.4 (17)
BMI category	
Underweight	5.6 (66)
Normal	49.6 (584)
Overweight	30.7 (361)
Obese	14.1 (166)
<i>BMI [Mean ±SD]</i>	25.1 ± 5.1
Smoking status	
Yes	27.8 (327)
No	72.2 (851)
Chronic medical conditions	
Diabetes mellitus	5.2 (61)
Hypertension	5.8 (68)
Dyslipidaemia	0.8 (10)
Cardiovascular diseases	0.3 (3)
Kidney disease	2.6 (31)
Liver disease	0.1 (1)
Anaemia	2.3 (27)
Cancer	0.2 (2)
Respiratory disease (asthma, COPD)	2.8 (33)
Allergies	7.9 (93)

Interestingly, adherence to mask-wearing after infection increased significantly compared to adherence rates before infection. The percentage of poorly adherent participants before infection decreased from 12.6% (n=148) to 6.0% (n=71) after infection. On the other hand, the percentage of strictly adherent participants increased from 44.0% (n=518) to 62.7% (n=739) after infection (P-value <0.0005, Chi-square test). Most participants had symptoms due to COVID-19 infection (92.4%, n=1088), with 45.7% having moderate symptoms (n=538). A minor proportion of participants had either severe (16.7%, n=197) or dangerous symptoms (1.2%, n=14). Furthermore, only 6.4% (n=75) required hospitalization due to COVID-19 infection. Among those 75 patients, the period of hospitalization varied ranging from less than a day to more than 7 days (Table 2). Only 6.5% of the participants experienced



Table 2: Characteristics of COVID-19 infection (n=1,178)	
COVID-19 infection status	% (n)
Incomplete recovery	11.1 (131)
Complete recovery	74.1 (873)
Current infection	14.8 (174)
How COVID-19 was transmitted to you?	
Confirmed contact with infected people	50.1 (590)
Unconfirmed contact with infected people	17.1 (202)
Touching infected surface	2.3 (27)
Undetermined	30.5 (359)
The incubation period of the COVID-19 infection	
Less than 2 days	14.7 (172)
3-5 days	34.5 (404)
5-10 days	15.3 (179)
>10 days	1.3 (15)
Undetermined	34.2 (400)
Adhering to mask-wearing before COVID-19 infection	
Poor	12.6 (148)
Fair	43.5 (512)
Strict	44.0 (518)
Adhering to mask-wearing after COVID-19 infection	
Poor	6.0 (71)
Fair	31.2 (368)
Strict	62.7 (739)
Period suffering from symptoms	
No symptoms	7.6 (90)
Less than 3 days	13.7 (161)
3-5 days	22.1 (260)
5-7 days	16.9 (199)
7-10 days	15.7 (185)
10-14 days	12.6 (149)
More than 14 days	11.4 (134)
Self-assessed severity of COVID-19 infection	
No symptoms	7.6 (90)
Mild	28.8 (339)
Moderate	45.7 (538)
Severe	16.7 (197)
Dangerous	1.2 (14)
Did you require hospitalization?	
Did not require hospitalization	93.6 (1103)
Regular care units	5.0 (59)
Both regular and intensive care units	1.4 (16)
How long were you hospitalized? ^ε	
A day or less	41.4 (31)
1-3 days	17.3 (13)
4-7 days	25.3 (19)

>7 days	16.0 (12)
Symptoms returned after two weeks	
Yes	21.1 (249)
No	78.9 (929)
Confirmed second COVID-19 infection	
Yes	6.5 (77)
No	93.5 (1101)
The severity of second COVID-19 infection relative to the first infection *	
More severe	13.0 (10)
Less severe	40.3 (31)
Same severity	46.8 (36)
[£] Percentages were calculated based on the total number of participants who required hospitalization (n=75).	
^{&} Percentages were calculated based on the total number of participants who had confirmed a second COVID-19 infection (n=77).	

a second COVID-19 infection. Among them, 13.0% reported that it was more severe (n=10), 40.3% reported that it was less severe (n=31), and 46.8% (n=36) reported that it was the same severity as the first infection (Table 2).

As shown in (Table 3), the most common reported symptoms by the study's participants were loss of smell (63.8%), followed by headache (63.3%), sore muscles (59.0%), and fatigue (57.9%). The associations between different symptoms and

complications or requiring hospitalization were investigated. All symptoms were significantly associated with having complications while upper respiratory congestion, vomiting, fever, dizziness, diarrhea, chest pain, fatigue, cough, difficulty breathing, difficulty concentrating, loss of appetite, and abdominal pain were significantly associated with the need for hospitalization (Table 3).

Of the 1,178 participants, 249 experienced complications

Table 3. Experienced COVID-19 symptoms among the participants, and their associations with having complications or need for hospitalization due to COVID-19 infection.

Symptoms of COVID-19	% (n) among total participants	% (n)	P-value	% (n)	P-value
	(n=1,178)	among those having complications (n=249)		among those requiring hospitalization (n=75)	
Upper respiratory congestion	24.1 (284)	37.8 (94)	<0.005	12.0 (34)	<0.005
Vomiting	8.2 (97)	12.9 (31)	0.005	23.7 (23)	<0.005
Fever	44.2 (521)	50.2 (125)	0.036	10.2 (53)	<0.05
Dizziness	22.3 (263)	40.6 (101)	<0.005	9.5 (25)	0.018
Headache	63.3 (746)	75.5 (188)	<0.005	6.3 (47)	0.902
Diarrhea	27.8 (327)	37.3 (93)	<0.005	9.8 (32)	0.003
Chest pain	28.1 (331)	46.9 (116)	<0.005	11.5 (38)	<0.005
Sore muscles	59.0 (695)	63.9 (189)	<0.005	7.5 (52)	0.06
Sore throat	40.6 (478)	57.0 (142)	<0.005	6.5 (31)	0.89
Fatigue	57.9 (682)	70.9 (176)	<0.005	9.2 (63)	<0.005
Cough	37.5 (442)	45.4 (113)	0.004	9.7 (43)	<0.005
Rhinitis	31.6 (372)	39.0 (97)	0.004	6.2 (23)	0.861
Difficulty breathing	28.6 (337)	47.4 (118)	<0.005	14.5 (49)	<0.005
Difficulty concentrating	26.7 (314)	48.6 (121)	<0.005	8.9 (28)	0.031
Rash	2.3 (27)	5.2 (13)	0.001	14.8 (4)	0.069
Loss of taste	54.2 (639)	65.5 (163)	<0.005	6.3 (40)	0.87
Loss of smell	63.8 (752)	73.5 (183)	<0.005	5.5 (41)	0.088
Loss of appetite	30.6 (360)	47.4 (118)	<0.005	10.0 (36)	0.001
Chills	42.4 (500)	58.2 (145)	<0.005	7.6 (38)	0.137
Abdominal pain	18.7 (220)	31.3 (78)	<0.005	10.5 (23)	0.006

due to COVID-19 infection (21.1%). Among these (n=249), depression was the most common complication among participants (79.9%, n=199). Other complications included blood clots (2.0%, n=5), lung fibrosis (1.2%, n=3), pneumonia (12.0%, n=30), kidney impairment (1.6%, n=4), and septic shock (2.0%, n=5).

Regarding the use of vitamins, 971 participants (82.4%) used at least one vitamin during their infection. The most commonly used vitamin/supplement by participants during the COVID-19 infection was vitamin C (75.8%, n=893), followed by zinc (59.9%, n=706), and vitamin D (48.3%, n=569). Vitamin C and zinc were perceived as effective by more than half of users (Table 4). Vitamin C use was significantly associated with gender (females 82.2%, n=531 vs. males 68.0%, n=362; p-value <0.005). In addition to confirmed infection with a mutant strain, having complications, symptoms returning after 2 weeks, and patients with symptomatic infection (p-value <0.005, for all the variables). Zinc use was significantly associated with gender (females 55.6%, n=359 vs. males 39.5%, n=210; p-value <0.005). In addition to confirmed infection with a mutant strain, having complications, patients with symptomatic disease, and symptoms returning after 2 weeks (p-value <0.005, 0.001, <0.005, and 0.005; respectively). Vitamin D use was significantly associated with gender (females 55.6%, n=359 vs. males 39.5%, n=210; p-value < 0.005). In addition to having confirmed infection with a mutant strain (p-value <0.005), having complications (p-value=0.001), having symptoms (p-value <0.005), and symptoms returning

after 2 weeks (p-value <0.005). Regarding natural substances (Table 4), honey, ginger, onion, and garlic were the most used natural substances during the COVID-19 infection, and they were all perceived as effective by more than half of users. Honey use was significantly associated with gender (females 39.8%, n=257 vs. males 32.1%, n=171, p-value 0.007). In addition to symptomatic patients (p-value <0.005), and having complications (p-value <0.005). Moreover, ginger use was significantly associated with mutant strain infection (p-value 0.035), and symptomatic infection (p-value <0.005).

Participants were asked about their perceptions regarding the effectiveness of both dietary supplements and natural substances in managing COVID-19. Only 4% (n=47) reported that supplements were ineffective, and 26.3% (n=310) were unsure about their effectiveness. Similarly, only 2.9% of the participants (n=34) documented that the natural substances were ineffective in managing COVID-19, and 17.1% (n=205) were unsure about that. Antipyretics, specifically Paracetamol, was the most used drug during COVID-19 infection (60.5%, n=713), followed by antibacterial drugs such as Azithromycin (23.3%, n=274). Other used drugs are listed in (Table 5).

DISCUSSION

This cross-sectional study provides an overview of the experience of the patients who were infected with COVID-19 in Jordan, especially, the use of supplements, natural products, and medications. Half of the participants reported that COVID-19 was transmitted to them after confirmed contact with infected patients. This observation emphasizes the value of isolating infected patients and underlines the significance of social distancing.⁹ Patients with COVID-19 have turned into a major source of infection, especially during the

Vitamin/ supplement	% (n)	Perceived as effective % (n)*
Vitamin C	75.8 (893)	62.9 (562)
Vitamin D	48.3 (569)	49.4 (281)
Zinc	59.9 (706)	53.4 (377)
Iron salts	16.1 (190)	42.6 (81)
Omega 3 fatty acids	12.9 (152)	38.2 (58)
Vitamin B	14.7 (173)	39.9 (69)
Multivitamins	18.0 (212)	44.8 (95)
Natural substances		
Honey	36.3 (428)	67.8 (290)
Black seeds	14.1 (166)	61.4 (102)
Garlic	31.1 (366)	56.6 (207)
Onion	31.9 (376)	60.1 (226)
Curcumin	12.1 (142)	57.0 (81)
Ginger	34.6 (408)	61.5 (251)
Qist	6.2 (73)	74.0 (54)
Herbs	54.3 (640)	56.9 (364)
Clove	2.2 (26)	23.1 (6)
Citrus	2.5 (29)	31.0 (9)

* The percentages were calculated among the participants who used the vitamin/supplement or natural substance

Drugs	% (n)	Perceived as effective % (n)*
Antipyretics (Paracetamol)	60.5 (713)	81.3 (580)
Antiviral drugs (Favipiravir, Sancovir®)	5.0 (59)	33.9 (20)
Antibacterial drugs (Azithromycin)	23.3 (274)	65.3 (179)
Steroidal anti-inflammatory drugs (Prednisolone, Dexamethasone...etc)	5.2 (61)	55.7 (34)
NSAIDs (Ibuprofen, Diclofenac...etc)	4.4 (52)	67.3 (35)
Anticoagulants such as enoxaparin (Clexane®)	2.7 (32)	43.8 (14)
Anti-allergic drugs such as antihistamines	9.2 (108)	58.3 (63)
Aspirin	8.0 (94)	68.1 (64)
Colchicine	0.5 (6)	16.7 (1)
Bronchodilators	6.2 (73)	63.0 (46)
Inhalers other than bronchodilators	6.3 (74)	66.2 (49)
Oxygen concentrators	3.2 (38)	65.8 (25)

* The percentages were calculated among the participants who used the drug

incubation period.¹⁰ The study's participants stated that the incubation period of COVID-19 was 3-5 days, which is within the incubation range (2-14 days) of the European Centre for Disease Prevention and Control.¹¹ This period is determined by how many days passed between patients becoming infected and the onset of symptoms.¹² Thus, it is still essential to raise awareness of personal hygiene and the value of following preventive measures such as wearing masks.⁹ Adherence to mask-wearing after COVID-19 infection increased significantly compared to adherence rates before infection.

This can be explained by the "Theory of Planned Behavior" which suggests that a person's behavior is dictated by his/her intention to perform that behavior, and the person's intention is influenced by the person's attitude toward that behavior as well as the environmental surroundings.^{13,14} The participants' attitudes towards wearing masks could be engendered after their COVID-19 infection. Mask-wearing is influenced by several factors such as gender, age, and ethnicity. For example, females are more adherent to mask-wearing than males.¹⁵ More than half of the study participants were female; therefore, it is possible that the 1.5x increase in mask-wearing adherence was caused by the high percentage of female participants. The most frequent symptoms reported by participants were loss of smell, headache, sore muscles, fatigue, and loss of taste, which is harmonious with the symptoms reported by the World Health Organization (WHO).¹⁶ In a review conducted by Grant et al., aimed at providing evidence-based knowledge regarding the symptoms which are associated with COVID-19 infection, six databases were searched, resulting in the selection of 148 publications. The most documented symptoms were fever (138 studies), cough (138 studies), and fatigue (78 studies).¹⁷

In the current study, loss of smell was the most reported symptom by the participants (63.8%), this high percentage can be explained by data collection time; the current study was conducted between March and May 2021, however, the previously mentioned review which included 148 studies was conducted in April 2020. Therefore, there is a one-year difference between the two studies. It is worth highlighting that the loss of smell was not reported by participants in several studies conducted during the early stages of the COVID-19 pandemic. For example, a retrospective study was conducted in March 2020 (the early stage of the COVID-19 pandemic), aimed to report epidemiologic, laboratory, radiologic, and clinical characteristics of COVID-19 patients in Jordan. Notably, it did not report the loss of smell.¹⁸

Worldwide, COVID-19 has been considered one of the challenges. It is essential to maintain a healthy nutritional state to combat the coronavirus.¹⁹ Since COVID-19 does not yet have a particular antiviral treatment, many patients take vitamins to boost their body's natural defenses against the infection, and to help their immune systems in fighting the virus.^{20,21} For example, vitamin C has earned an increasing interest, due to its' several pharmacological properties (antioxidant, antiviral, and anti-inflammatory effects), which make it a possible therapeutic choice in the management of COVID-19.²²

A cross-sectional study was conducted in Jordan, to determine

the most used medications and natural products during the COVID-19 pandemic; the results revealed that vitamins C and D were used by a high percentage of the participants (79.3%).³ Similar results were found in another study conducted in Jordan.²³ Another study was conducted in a country neighboring Jordan (Syria), to explore the experience of those who have COVID-19 infection; vitamin C was the most used supplement by the study's participants (76.4%), whereas vitamin D was used by more than half of the participants (54.7%).²⁴ This is consistent with the findings of the current study, which showed that many participants used vitamin C during their COVID-19 infection (75.8%).

Despite the development of pharmacological treatment regimens and the availability of the COVID-19 vaccine, the interest in natural products and herbs is high.²⁵ According to a cross-sectional study (n=1,820) conducted before COVID-19, the use of herbs is highly prevalent in Jordan (53.3%). Additionally, one of the predictors for using herbal products was being a female which is consistent with the use of honey in the current study.²⁶ In a more recent cross-sectional study conducted to assess the prevalence of natural product use in Jordan during COVID-19, the most used natural products were citrus fruits, honey, and ginger (78.8%, 63.0%, and 53.1%; respectively).³

In the present study, honey, ginger, onion, and garlic were the most used herbs among the participants. In Vietnam, a study aimed to assess the indication and prevalence of herbs use, about half of the study participants documented taking herbs during the COVID-19 pandemic. Ginger, honey, and garlic were the most frequently used herbs, and these herbs were mainly used to treat cough, nasal congestion, sore throat, and fever. Around 70.0% of the study participants believed that these herbs are effective in treating minor health conditions.²⁷ In Saudi Arabia, a cross-sectional survey was conducted (n=1,054) to estimate the prevalence of natural products and herbs used as a protective measure during the COVID-19 pandemic, a significant increase in herbs and natural products use because of the pandemic was found (p=0.036). In addition, honey was used by a high percentage of the study participants (84.0%), and ginger was used by more than 40% of them.²⁸

In Bangladesh, a cross-sectional study was conducted (n=1,222) to assess the use of herbs in response to COVID-19, more than half of the participants (57.6%) documented using herbs to reduce the risk of COVID-19 infection. Additionally, ginger was used by more than 55.0% of the participants, whereas honey was used by 30.0% of them.²⁹

In Nepal, a study was conducted to report the status of natural product use during the COVID-19 pandemic, according to the study's findings, natural product use has increased during the COVID-19 pandemic and the majority of the participants suggested using these products to avoid COVID-19.³⁰ All the previous-mentioned herbs have documented primary health benefits and antiviral activity, which might explain the high prevalence of their use and their popularity during the pandemic.³¹



Among the current study participants, antipyretic, such as paracetamol, was used by more than 60.0% of them. In Syria, the same result was found, Panadol® (paracetamol) was used by 68.4% of the participants during their COVID-19 infection. According to the WHO, a common symptom of COVID-19 is fever.³² Thus, many patients take antipyretics to reduce their body temperature. A general guideline for COVID-19 management was developed, it was stated that antipyretics can be used to treat fever (when the temperature is above 38.5°C).¹⁸

Most COVID-19 patients experience mild symptoms and antipyretics intake may be sufficient in these cases.³³ Furthermore, the national guidelines regarding clinical management of COVID-19 suggested the use of paracetamol to manage the mild symptoms, in addition to the use of zinc and vitamin C.³⁴ The above-mentioned advice is consistent with vitamins and medications used among the present study participants.

Azithromycin was the second most used drug in the current study. Azithromycin has antiviral and immunomodulatory effects; therefore, it may play an essential role in COVID-19 management. In other viral infections, Azithromycin use was related to less mortality and lower ventilation days.³⁵ Azithromycin can lessen the amount of the virus that enters

the cell, as well as boost the immune response in response to the virus.³⁶ Although Azithromycin exhibits promising pharmacological and pharmacokinetic properties; its' use in COVID-19 infection is still a matter of debate; as the currently available data does not permit its' widespread use due to the limitation in the methods used. For example, it has been mostly studied with Hydroxychloroquine, thus, it is challenging to analyze the effects of Azithromycin alone.^{37,38} One of the study's limitations is the sampling methods, where some persons are more likely to respond to the survey than others, and participants decide completely for themselves whether to take part in the survey "self-selection bias". For example, the survey may only be accessible to those with internet access, and therefore, self-selection may result in biased results.

AUTHORS' CONTRIBUTIONS

All authors were involved in all parts of study and manuscript preparation including literature search, study design, analysis of data, manuscript preparation, and review of the manuscript.

CONFLICT OF INTEREST

The authors declare no relevant conflicts of interest or financial relationships.

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