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COVID-19: THERAPEUTIC DISINFORMATION AND INTOXICATIONS

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ABSTRACT

The new coronavirus pandemic alarmed the world. Misinformation regarding prevention and treatment for safeguarding against this pandemic seemed to be life-threatening along with the spreading pandemic. Public health authorities in the world tried to battle this virtual virus by offering true information and correcting misinformation. However, the public misinformation through social media caused toxicological consequences in some parts of the world which provoked awareness, response, and concern of the public health authorities including the Food and Drug Administration (FDA) and the toxicology community. This study analysed the published literature on therapeutic disinformation during the COVID-19 pandemic and its toxicological effects. The electronic databases searched were Scopus, MEDLINE and Scielo. The used keywords were: "COVID-19", "misinformation", "social media", "public health", "drug toxicity", and "education". Finding new strategies for the prevention and treatment of the coronavirus again stresses the role of public education about true drug information. Hundreds of chemicals were/are being tested to be prophylactic medications or healing drugs for the coronavirus. Therefore, spreading accurate information and editing misinformation can be crucial. In summary, this commentary is going to bring attention to misinformation regarding prevention and treatment for safeguarding against the COVID-19 pandemic and its toxicological consequences and the need for public education on the appropriate use of therapies.

KEY WORDS: COVID-19; misinformation; social media; public health; drug toxicity; education

INTRODUCTION

The 2019 novel coronavirus (2019-nCoV) later renamed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes the disease COVID-19. Despite COVID-19's first appearance in China (December 2019 in Wuhan, Hubei province), it became a contagious pandemic and the declaration of the World Health Organization (WHO) as a Public Health Emergency of International Concern ensued [1]. In parallel with the emergence of the new disease, the people of the world encountered large amounts of correct and incorrect information regarding the strategies for the prevention and treatment of the disease. Since the misinformation on COVID-19 on social media can spread faster than the pandemic, it can bring about panic and confusion in the public and thus decelerate the proper response to the outbreak. In this context, misinformation can be regarded as the most contagious component of COVID-19 [2]. Noteworthy, previous research showed that incorrect information can spread faster and reach more audiences in comparison with correct information [3].

Combating misinformation

To countermeasure the toxic infodemic, health authorities and scientific communities started to distribute valid information. WHO launched a platform called WHO Information Network for Epidemics (EPI-WIN) to deliver correct, evidence-based information with the help of experts and consultants of the risk communication team. The team closely is monitoring the common social media and regional authorities in the search for misinformation to neutralize them [4]. Advice through "myth busters" also informs the public to be able to distinguish between rumour and fact. The most prominent points in terms of toxicology are the following: (i) "…Drinking alcohol does not protect you against COVID-19 and can be dangerous… (ii) …Spraying alcohol or chlorine all over your body will not kill viruses that have already entered your body and can be harmful... (iii) …Are there any specific medicines to prevent or treat the new coronavirus? To date, there is no specific medicine recommended to prevent or treat the new coronavirus (2019-nCoV)…" [5].

A very recent study found that the general public in the United States and the United Kingdom suffered from important misunderstandings regarding COVID-19 and thus governmental organizations, scientific communities, and social media need to correct this

hazardous misinformation [6]. Recently, an unprecedented mass poisoning and fatality occurred in Iran due to the misinformation distributed by social media just after the first days of the coronavirus outbreak in this country. The rumour started that alcohol consumption can prevent COVID-19 and thus some citizens be persuaded to provide this panacea at any cost. The consumption of fake alcoholic beverages (industrial alcohol tainted with 5% sodium hypochlorite solution, methanol instead of ethanol, an adulterated mixture of ethanol, or methanol and other toxic alcohols plus colour additives) purchased from the black market caused more than 2000 poison cases and more than 200 fatalities in 10 provinces of Iran during a short period of the coronavirus outbreak. The interesting finding was that the death rate from this poisoning was nearly twice as high as the death rate of COVID-19 at that time [7]. Methanol poisoning is a worldwide problem and related outbreaks have been reported in countries that produce and sell the illicit, adulterated alcoholic beverages including India, Uganda, Cambodia, Czech Republic, Kenya, Ecuador, Estonia, Indonesia, Libya, Nicaragua, Norway, Pakistan, Romania, Sudan, Turkey, and Nigeria [8, 9]. Therefore, it is indispensable to consider the risk of abusing alcohol as a pharmacological agent during future infectious pandemics.

Concern toward disinfection

Using disinfectants is another concern that needs proper information dissemination since they are potentially hazardous agents. Two common categories of disinfectants that are used for COVID-19 included alcoholic solutions (e.g. ethanol, isopropyl alcohol) and chlorine-based solutions (e.g. bleach) [10]. Even though the poisoning reports regarding these chemicals during the current virus outbreak are yet to be fully available in the literature, there was/is a concern about them, since at least 300 calls to the poison control centres attributed to the improper use of these chemicals during COVID-19 [11]. The toxicity of these substances is well documented [12, 13]. Therefore, more endeavours are needed to correct the information and subsequent behaviour of people. The FDA warned about the toxicity of potential drinking bleach releasing the correct information and the "list of products that meet Environmental Protection Agency (EPA) criteria for use against SARS-CoV-2" [14, 15].

Misinformation on therapeutics, toxicological alerts, and future educational demand

Drugs are chemicals that can be used for the prevention or treatment of diseases. In response to the urgent need for establishing a safe drug therapy for the new virus disease, WHO launched a large international clinical trial study known as "Solidarity" to examine the safety and efficacy of drugs including remdesivir, lopinavir/ritonavir combination, Interferon beta-1a, and chloroquine or hydroxychloroquine [16]. However, the delivery of misinformation about the coronavirus treatment, on the TV and the tweeter by a public figure, shortly thereafter resulted in at least one fatal poisoning in the United States [17] and three cases of drug poisoning in Nigeria [18]. Even though, the former case of poisoning resulted from an unpredictable source of an assumed drug (fish aquarium cleaner contained chloroquine phosphate), it provoked the FDA to communicate the risk to the public by editing the misinformation. The FDA issued a warning letter and at the same time committed to keeping the chemical away from the public. Similarly, the toxicology communities including The American Academy of Clinical Toxicology, The American College of Medical Toxicology, and The American Association of Poison Control Centres jointly released a statement to warn the public about the toxicity and potential fatality of the assumed drugs (hydroxychloroquine and chloroquine) [19, 20]. Moreover, with the help of scientists and clinicians, countries around the world prompting to perform clinical trials to examine the safety and efficacy of preventive therapies and drugs for treatments. A shortcut strategy is the repurposing of the existing drugs. More than hundreds of interventional clinical trial studies are underway (e.g. by keyword-based search on the https://clinicaltrials.gov) to evaluate the safety and efficacy of potential preventions or therapies for COVID-19. All these candidate drugs need to be evaluated for their efficacy and safety and that is part of the logic for conducting clinical trials. Again, social media is circulating the news of these promising treatments faster than the official registrations and of course, before the safety evaluation and approval for the treatment by the authorities. For example, the first news about colchicine as a potential COVID-19 drug was released in the middle of March 2020 that was a few days before the first clinical trial registrations (e.g., one first registered the late March 2020) [21]. Collectively, there were few colchicine clinical trials conducted around the world to evaluate the safety and efficacy of this drug toward the virus. Colchicine is an alkaloid that is isolated from plants and introduced as an FDA-approved drug for acute gout flair and Familial Mediterranean Fever in 2009. It is safe when used in the range of therapeutic doses but taking a toxic amount of either drug or plant

source can be fatal. Furthermore, the diagnosis of colchicine poisoning is sometimes challenging since it can be misdiagnosed as an infectious disease or food poisoning [22, 23]. Even the plant containing colchicine (*Colchicum Spp.*, dried seeds) can be purchased by online shopping. The plant is composed in the poem of Guillaume Apollinaire, a French poet [24], as below:

AUTUMN CROCUSES

In fall the fields are poisonous but fair

Where, slowly poisoning, the cattle graze.

The meadow saffron, colchicum, thrives there,

Color of lilac and the circles under eyes.

My life pastures so on the autumn hue

Of your eyes and slowly poisons itself too.

Children in queer jackets come and play

Harmonicas and pick the purple flowers

Which are like mothers, their own daughters' daughters.

When your saffron eyelids raise and lower

They are like flowers that a crazy wind flutters.

The shepherd sings the cattle on their way

As, slowly and flowingly and for all time, they pass

From the broad evil-flowered autumn grass

Also, the plant recently inspired a drama movie in Iran; with the original title of Sourenjan, a Persian common name for meadow saffron, *Colchicum*, meaning literally as Flower of Regret (Fig 1.).

Interestingly, renowned antidotes such as N-acetylcysteine (NAC) and Desferal are among the candidate lists of repurposing drugs for COVID-19. NAC is considered a mainstay

therapy for acetaminophen toxicity that is a major cause of liver failure in the United States and the United Kingdom [25, 26]. However, the safety of NAC is dose-dependent meaning that it can cause toxicity when the dose is increased [27]. Desferal is an iron and aluminium antidote but it also has potential toxicity [28]. The last news on social media has stated that ivermectin can be a repurposed drug for COVID-19 [29]. Of course, initial scientific research showed a hope [30] but it is of paramount importance to deliver this fact to the general public that it is not allowed to use before the final approval by the health authorities and at the same time self-medication is a huge mistake that people may commit and thus it is crucial to make aware the public of the risk of misinformation.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it is vital to educate the general public about the most important principle of pharmaco-toxicology that the *Paracelsus* has taught since the sixteenth century: "the dose differentiates a poison from a remedy" [31]. A recent infodemiological study evaluating the internet health information regarding preventive measures for the COVID-19 proposed that the use of public health organizations' official websites needs to be encouraged in comparison with other informational websites by the public to the users obtain more correct health information and subsequently increase the chance of sharing by providing the availability on the top list of search engines results [32]. During the pandemic diseases like COVID-19, a lack of awareness and preparedness of the public people may put them at risk of life-threatening conditions. Therefore, disseminating rapid, correct information declared by the official authorities and share via social media is of key importance. Finally, it is recommended to conduct more infodemiological studies about the indiscriminate use of pharmacological agents around the world to be used as a framework for policymakers in learned communities such as scientific pharmacology and toxicology societies.

Conflicts of interest
The author declared no conflict of interest.

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Figure 1. Movie poster, *Colchicum* 2019. Source:
http://sourehcinema.org/movie/219/Colchicum-Sourenjan [access: 14.01.2022]