



## The Effect of Chamomile Extract on Coronavirus

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### ABSTRACT

Acute respiratory Syndrome (SARS) is an uncommon respiratory illness that is transmitted primarily by respiratory droplets or direct contact with an infected person. The COVID-19 initially appeared in late 2019 in Wuhan, China, and spread everywhere around the globe. Earlier in 2003, the coronavirus was known due to the human SARS-CoV virus, which infected 8,000 people and caused 800 deaths in southeast Asia and Canada. It should be mentioned that in 2012, another coronavirus, called Middle East respiratory syndrome coronavirus, infected Saudi Arabia and 27 other countries. The SARS-CoV2 belongs to a family of viruses called Coronaviruses that can infect bats, birds, pigs, cows, and different mammals. Some plant extracts are shown to inhibit microorganism replication and may be utilized in medication to treat infectious and non-infectious diseases, one of which is chamomile. Chamomile medicinal plant, that has 120 biologically active compounds, the most necessary of which are flavonoids, like apigenin and luteolin, that are shown to possess antiviral activity.

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### Introduction

Severe acute respiratory syndrome (SARS) is a communicable disease caused by the SARS-corona virus which has a high potential for transmission through personal contact (1). Coronaviruses (COVs) are an outsized family of viruses found in all humans and animals. They are single-stranded positive RNA viruses that have the most important famous ordination (30Kb) among RNA viruses (2,3). Human coronaviruses (HCoVs) represents a significant cluster of COVs related to respiratory diseases ranging from the common cold to severe respiratory illness and bronchitis.

the foremost common symptoms of SARS are cough, high fever (>38° C), chills, seizures, headache, dizziness, progressive chest radiographs, and blood diseases. The incidence higher than 60 years

will increase up to 43rd to 55th (4). According to the most recent statistics obtained from the World Health Organization as of April 25, 2020, the number of confirmed cases of COVID-19 in 213 countries was 2,686,785 and the number of confirmed deaths was 184,681 while 82,089 of which were new cases (fig 1) (5).

Before the appearance of COVID-19, six strains of the virus were antecedently famous to be human pathogens. However, not all of them are unhealthful. as an example, Hcov-Hku1, Hcov NI63, Hcov-oc43, and Hcov229E solely cause colds. In distinction, each severe acute respiratory syndrome coronavirus and Middle East respiratory syndrome coronavirus have had significant mortality rates over the past 20 years (9.6% for SARS

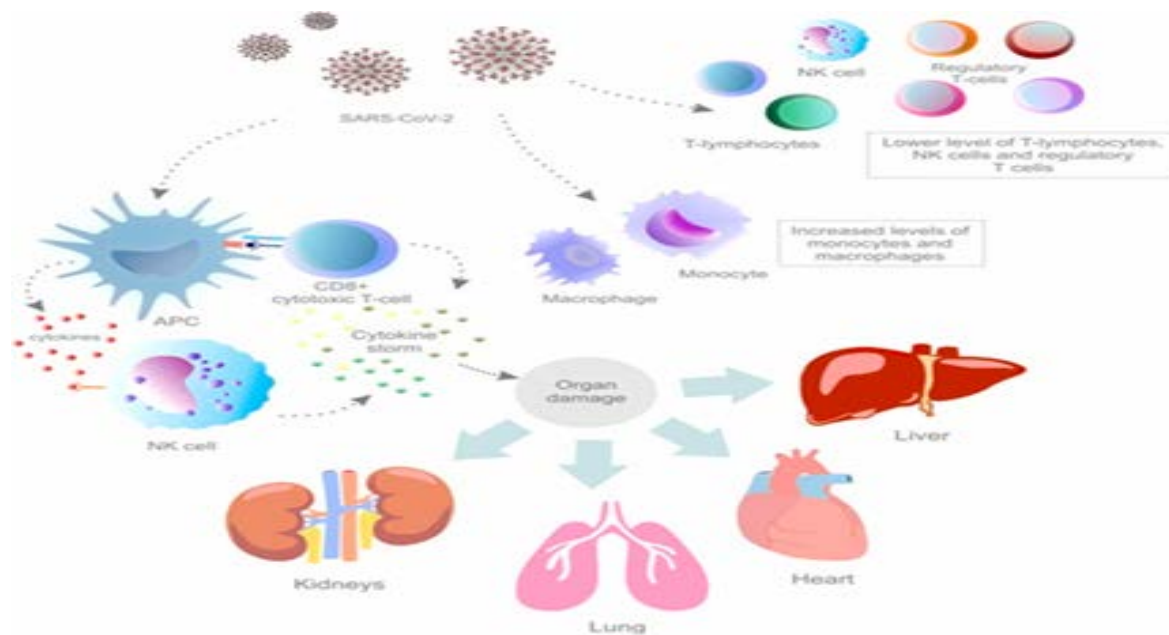
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**Figure 1.** Immunological options of SARS-CoV-2-associated pathology (6).

Before the appearance of COVID-19, six strains of the virus were antecedently famous to be human pathogens. However, not all of them are unhealthful. as an example, Hcov-Hku1, Hcov N163, Hcov-oc43, and Hcov229E solely cause colds. In distinction, each severe acute respiratory syndrome coronavirus and Middle East respiratory syndrome coronavirus have had significant mortality rates over the past 20 years (9.6% for SARS and 34 for MERS-Cov). Its mortality rate is unknown since the malady remains in its infancy (7).

There is presently no specific treatment available for COVID-19 and analysis of treatment is still in progress. However, the functions of used treatments are restricted to stopping the disease and the certified treatments prevent any complications and injury to the body. Some early studies have examined the utilization of potential compounds, like the protease inhibitor lopinavir/ritonavir, that usually treat patients with nonheritable immunological disorder virus (HIV) and nonheritable immunological disorder syndrome. alternative antiviral therapies rumored from human unhealthful Covs embody nucleoside analogs, neuraminidase inhibitors, remedial, umifenovir (arbidol), tenofovir disoproxil, and lamiodine (3TC) (8).

Chamomile is a perennial plant native to Europe and is one of the most widely used medicative plants for hundreds of years (9). In Iran, it is a member of the composite family and is widely known by two species of German chamomile (*Matricaria*) and Roman chamomile (*Chamaemelum Nobile*). German chamomile is specifically the most commonly used kind for medicative functions (10). It has anti-inflammatory, analgesic, antibacterial, antiviral, antifungal, antispasmodic,

and sedative properties (11). Chamomile has 120 compounds together with 28 terpenoids and 36 flavonoids (12).

Flavonoids are lush phenolic compounds in plants, and their effects on human health are usually due to their potential ability to scale back the concentration of free radical scavenging in biological systems that defend against antioxidants (9). The biological activity of chamomile is principal because of phenolic compounds. Primarily, the flavonoids are apigenin, quercetin, patolitin, luteolin, and their glucosides, similarly because of the main components of the extracted essential oils, like its oxides and azoles (13).

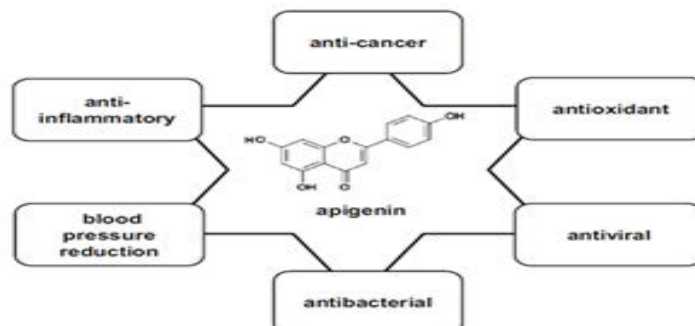
Flavonoids are composed of roughly 5,000 compounds that with chemicals include a standard phenylchrome structure (C6-C6-C3) with one or a lot of hydroxyl substituents and are typically categorized into flavonoids, flavanols (catechins), isoflavones, Flavonols, and anthocyanins. Flavonoids are shown to possess a range of biological effects on mammalian systems in vitro, similarly on the act as free radical scavengers and antioxidants in vivo, with mutagenic, anti-inflammatory, and antiviral effects. Additionally, alternative effects of flavonoids are attenuated plasma levels of low-density lipoproteins, inhibition of thrombocyte aggregation, and attenuated cell proliferation.

These effects are associated with their actions in inhibiting the cell cycle, reducing oxidative stress, rising the effectiveness of detoxification enzymes, causing apoptosis, and stimulating the system (14). Flavonoids are common nutrients that are found in foods, like vegetables, fruits, and herbs (15).

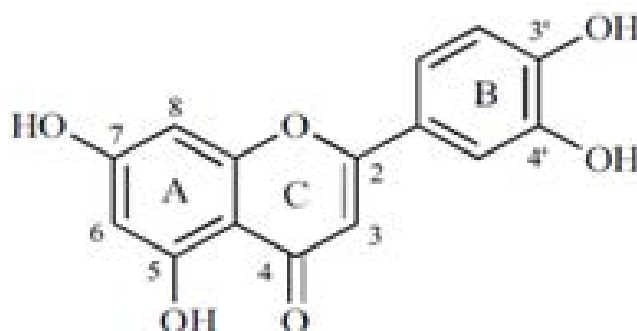
Some flavonoids, above all apigenin, luteolin,

quercetin, amentoflavone 28, and purine have antiviral activities (4). The antiviral activity of some flavonoids against coronaviruses is directly mediated by inhibition of protease 3c (3cl pro) (16). Protease 3c is important for the replication of acute respiratory syndrome-associated coronavirus (SARS-COV)

and will be a promising drug target (17). Apigenin is the most vital flavonoid in chamomile, most of which is glucoside and a little quantity of that is free (fig.2) (12). Luteolin is one of the common flavonoids in edible and medicative plants and is employed to treat a large variety of pathogens (fig 3) (15).



**Figure 2.** Chemical structure of apigenin and its physiological effects (18).



**Figure 3.** Chemical structure of luteolin

## Literature Review

Chamomile (*Matricaria chamomilla*) extract contains its apigenin and Luteolin (causing reduction of leukocyte infiltration), a-Bisabolol (which has an anti-inflammatory effects), Chamazulene (that provides anti-inflammatory and antipyretic effects), Guaiazulene (antipyretic), Matricin (Anti-inflammatory effects). Due to, the above mentioned alternative appreciated effects, chamomile can function as a promising treatment for Covid-19 (19).

In a study on the replication of the coronavirus family, extracts of three plants, namely chamomile, black seed, and citrus Sinensis, were examined. Based on the results of the aforementioned study, the extracts secreted interleukin-8 and expressed the transient receptor potential proteins (TRPs) gene as well as the virus load. Moreover, it was found that chamomile extract had the best impact among them. The TRPs belong to the ion channel families that are accountable for the spread of cellular functions, and the regulation of intracellular calcium concentrations. The interactions of the nucleocapsid (N) and nonstructural protein three (nsp3) are

necessary for CoV amplification. The nsp3 interacts with the N protein through its EF motif site, that contains a calcium-binding domain, which implies that this interaction will be calcium-dependent. intracellular calcium signaling has been shown to extend reactive oxygen species in mitochondria, which could be a replication of the respiratory disorder virus. The antiviral infection will conjointly increase the intracellular calcium concentrations. These findings recommend that intracellular calcium concentrations could also be necessary for viral replication. Hence, viruses will target cellular mechanisms that regulate this concentration (20).

Although the utilization of flavonoids against COVID-19 has not been clinically studied, it will be a promising strategy due to its wide range of biological activities (6).

The next table illustrates some experimental studies that related to the relationship between Chamomile and Coronavirus:

**Table 1.** Summary of experimental studies on the Effect of Chamomile on Coronavirus

Author	Year	Reference	Used Composition	Clinical Outcomes
El Sayed	2020	(21)	TaibUVID nutritional supplements (Nigella sativa, chamomile, and natural honey)	70% of COVID-19 contacts (n = 14) (on regular TaibUVID intake) did not become infected with get SARS-COV2 infection
Salehi	2019	(22)	Apigenin in Chamomile tea, leaves of spinach, parsley, oregano, oranges, celery, onions, red wine	Anti-oxidant, anti-carcinogenic, anti-proliferative, anti-inflammatory, antiviral
Cushnie and Lamb	2005	(22)	Luteolin in Green pepper, chamomile tea, thyme, celery, spinach	Anti-inflammatory, anticancer, anti-allergic, anti-oxidant, anti-viral
Anand David	2016	(22)	Quercetin in Fennel, seeds of pepper apples, onions, berries, broccoli	Anti-inflammatory, antihypertensive, anti-obesity, anti-atherosclerotic, antiviral
Liskova	2021	(6)	Flavonoids against inflammatory storm	Flavonoids are potential modulators of COVID-19-related inflammatory and immune deregulations and also modulate inflammatory signaling associated with SARS-CoV-2.
Romella, Haider	2021	(19)	Chamomile extract nasal irrigation	Potential treatment for Covid-19 related anosmia
Srivastava	2007	(23)	Chamomile And Apigenin	anti-oxidant, anti-mutagenic, anti-cancer, anti-inflammatory, and anti-proliferative properties
Gates	2007	(24)		

## Conclusion

According to the previous analysis, chamomile extract can stop the proliferation of viruses, since it contains several biological compounds, and flavonoids, A variety of those flavonoids, together with apigenin and luteolin, are shown to possess antiviral and antibacterial properties. They need antivirals, hence this flavorer medication will most likely be able to treat the new coronavirus.

## Conflicts of Interest

The authors declare no conflicts of interest

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