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The traditional use of Medicinal plant and their natural product to combat covid–19

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Abstract

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the source of the current COVID-19 epidemic, which made it very challenging to find effective medicines. Conventional drugs and vaccines have raised concerns about reliability and safety. Treatment for "SARS-CoV-2" may include questionable medicines or vaccinations. Phytochemicals are a successful therapy for COVID-19, but further study is needed to identify anti-viral drugs. To investigate COVID-19 treatment with medicinal plants (MP), this study includes screening phytochemicals. The botanical elements were gathered from experts. The kind of secondary metabolites was then determined by a qualitative phytochemical screening (PS) of plant extracts. Plants such as "eucalyptus species, ginger, pepper, onions, berries, garlic, and lemons (primary components)" were regularly employed. PS was used in the discovery of the terpenoids, fatty acids, steroids, flavonoids, and saponins. By disrupting the entrance, replication, assembling, and discharges of viruses within their host targets, identified natural phytocompounds were shown to have the potential to demonstrate anti-viral effects. To find potential lead chemicals for anti-viral drugs during this time of fast development, the pharmaceutical sector specialized in extracts of phytochemicals from MP and aromatic herbs. We effectively combat SARS-CoV-2 and other coronaviruses, MP and phytocompounds have become crucial. The well-known natural goods spur people to work together and raise money to promote scientific research into additional phytochemicals from MP to develop an antiviral medication to fight COVID-19.

Keywords: SARS-CoV-2, COVID-19, Medical plante, Phytochemical screening.

1. Introduction

As of early March 2020, COVID-19 is one of the pandemic illnesses that are now sweeping the world, according to the World Health Organization (WHO) (Alamri et al., 2020). Globally, the illness has killed countless individuals and afflicted billions more. Immuno-compromised individuals are the most at risk. It shows that "SARS-CoV-2", the viruses that were found to cause "SARS" (severe acute respiratory syndrome) and the "MERS"(Middle East respiratory illness), share some similarities (Brahmi et al., 2022). Nevertheless, antiviral drugs utilized to treat "MERS" and "SARS" are also commonly used to diagnose COVID-19 because the genetic sequences of the two viruses being quite similar. Drugs that destroy "SARS-CoV-2", prevent the multiplication, and enhance human defenses against The COVID-19 is required for long-term environmental and planetary health. Nature, via natural products, may hold the key to defeating the COVID-19 pandemic. The small-molecule medications may be created in a lab or can be derived as natural products biosynthesized by the ecosystem, such as MP or bacteria (Hafez et al., 2021). Since the middle Ages, MP has been utilized to treat both communicable and non-communicable illnesses due to its ability to biosynthesize large amounts of bioactive phytochemicals. Based on their plant parts, and anti-viral promises, MP has been thoroughly examined for their therapeutic characteristics. Understanding the mechanisms of action of isolated plant-derived chemicals and complex plant extracts is crucial as it may assist in paving the path.

The possibility for coronavirus with "SARS-CoV-2" illness exists inside MP used treat viral disorders. Traditional medical systems of India have been used at this time to combat COVID-19 (Hui et al., 2022). In numerous nations, including India on the Asia continent, distilled herbals and cocktails of extracts rich in natural ingredients have been described. Several possible anti-viral medication lead molecules may be generated from existing treatments to treat SAR-CoV, influenza, or symptoms related to SAR-CoV-2 as a baseline (Iheagwam and Rotimi, 2020). Therefore, there is hope that the secondary metabolites or phytochemicals produced by MP include phytochemicals that might kill the "SARS-CoV-2" virus, prevent it from multiplying, or increase the body's resistance. One of the newly discovered natural compounds with anti-viral properties beside "SARS-CoV-2" is hyperacid. This research identifies significant MP used in conventional medicine and reveals prospective phytochemical for drug discovery and development.

In a study (Islam *et al.*, 2021), various plant-derived chemicals and MP used a virtual screening method. After performing molecular docking and all-atom 20 ns molecular dynamic simulation experiments, several plant-derived chemicals MP were subjected to high-throughput virtual screening. Three well-known targets for therapeutic research were the "SARS-CoV-2" RNA-dependent RNA-polymerase (RdRp), 3CLpro, and PLpro enzymes used in the screening. The goal of the study (Khadka *et al.*, 2021) was to provide molecular docking of the ligand library made up of natural compounds and medications that have been repurposed for use in treating COVID-19 using the spike protein (S), major protease and RdRp of the target proteins. The targets were prepared and minimized for the docking process, the grid box was built using the binding site data, and the docking calculations were carried out using the default parameters and normal mode of the Cresset Flare program.

A study (Khanh and Hoa, 2021) collected primary information on the MP utilized during COVID-19 using a web-based survey. It determined the MP' Relative Frequencies of Citation (RFC). The Kruskal-Wallis and Wilcoxon tests were used to evaluate the connection between the recorded plants and the various variables. The relationship between the qualities of respondents and the information sources they follow was assessed using the chi-square test. Through research and awareness campaigns, the government should investigate the

effectiveness of these MPs and control the spread of false information. A web-based cross-sectional survey of the common population (20 to 70 years old) was carried out in the study (Luo *et al.*, 2020). An 11-item structured questionnaire was used to gather data using Google Forms; it was created and evaluated by professional conclusion using Aiken's V (Aiken's $V > 0.9$). Several community factors and respondents' COVID-19 status were connected with the considerable usage of MP for prevention and Treatment.

The purpose of the paper (Mlozi, 2022) identified novel drug pushes that concentrate on the Covid-19 infection main protease, a starting program of combined structure aided was used for drug planning, high throughput screening, and virtual medication screening. A variety of ailments may still be treated and prevented using plant-based medicines and MP, according to current research. In the current circumstances, they focused on a few secondary metabolites produced from plants that showed active anti-viral activities against coronaviruses by obstructing the key machinery involved in their pathogenesis and reproduction cycle. A study (Natesh *et al.*, 2021) provided a toxicity and solubility prediction. The solubility of compounds was computed using MarvinSketch. The acute oral toxicity was predicted using the DL-AOT prediction tool. Gracillin and proanthocyanidins are the highest two substances using the lowest scores for connecting (-9.2 Kcal/mol), suggesting they have great potential as 3CL protease inhibitors and attractive candidates for developing anti-coronavirus drugs.

A study (Pandit and Latha, 2020) highlights research and ethnobotanical knowledge on plants and the compounds found in them used to treat diseases brought on by coronavirus-related viruses. Here, they provide a critique of prior studies and explain how to use available data to find fresh therapy approaches to combat COVID-19. Treatment for SARS-CoV may benefit greatly from a combination of IFNs, especially IFN-, with other anti-viral and anti-inflammatory natural products. Additional research and chemical alterations of naturally existing anti-SARS-CoV molecules were required to find parameters that improve effectiveness while lowering toxicity and adverse effects. Six significant targets complicated in transmitting and replicating "SARS-CoV-2" were molecularly docked in study (Prajapati and Kumar, 2020). 42 HMP bio-actives were examined for their molecular interaction, activation energy, biological pathway enrichment, and inhibition constant opposite to these targets. When predicting activity spectra for compounds, these chosen HMP bio-actives demonstrated decreased toxicity with pleiotropic biological activities, including anti-viral properties. Recent studies suggest that HMPs might be developed as COVID-19 therapeutic alternatives.

According to a study (Upadhyay *et al.*, 2023) chemicals from MP were used to investigate several "SARS-CoV-2" therapeutic targets. These substances may serve as potential leads and nutraceuticals in managing or preventing COVID-19. These molecules' scaffolds may be improved to facilitate minor flaws in their metabolism and toxicity. The findings further imply that these substances will aid in some way in disproving the outdated notion that "one gene, one drug, one disease" governs drug research. However, to validate the pharmacological therapeutic efficacy of these ground-breaking medications as an anti-"SARS-CoV-2" therapy, more *in vivo*, *in vitro*, and clinical investigations are required. In study (Villena *et al.*, 2021) gathered herbal remedies from 26 COVID-19 treatment regimens. Eight core combinations and ten equations were identified as viable possibilities using complex system entropy and unsupervised hierarchical clustering. Increasing awareness of the various benefits of traditional remedies for COVID-19 prevention and Treatment was important as the disease's worldwide expansion worsens. It is urgent and vital that traditional and conventional medicine be integrated during the current worldwide COVID-19 eruption.

2. Materials and methods

The therapeutic herbs that traditional healers use to fight COVID-19 have been discovered, and their extracts have been gathered from plants. The first group of compounds includes the main ingredients we mentioned, made up of plant components. Before being heated, leaf extracts were the first kind of substance practitioners provided, and patients used them by inhaling the hot fumes. The second group of components included the same things as the first group except for eucalyptus levels; patients drank the combination of these heated fluids as a cocktail. We used distilled water to extract both types of plant components. Collected extracts were then subjected to PS processes to ascertain certain plants' secondary metabolite composition used to combat "SARS-CoV-2". The biological test recommendation is the last.

According to the previously disclosed standard techniques, qualitative PS of "steroids," "glycosides," "terpenoids," "flavonoids," "alkaloids," tannic acid," and "saponins" was carried out.

The formulation is created by mixing 0.1 g of the extract with one drop of Iron (III) chloride solution and one mL of glacial acetic acid, putting it beside the test tube, then adding one mL of H₂SO₄ to the combination. The brown ring structure suggested glycosides were present. 0.1g of the extract and one ml of were combined, and the same amount of ml of ethanoic anhydride was added. The next step was gradually adding two drops of H₂SO₄ to the liquid in the test tube. The attending of cardiac glucoside was indicated by color shifts from violet to blue/green. The batter is created by mixing 0.5 g of extract with one ml of pure water. Add a few drops of Iron(III) chloride to the filtrate after the mixture has been agitated and filtered. There were tannins present because blue-black precipitates formed.

Three milliliters of one percentage of aqueous hydrochloric acid and around 0.5 g of the extract were combined in a steam room. Following filtration of the combination, the one ml filtrate was equally divided into two test tubes. Alkaloids were present because precipitates formed when either of the last two reagents was introduced.

A value of 0.25 g of plant extracts was blended with 15 ml of distilled water, and then strained. About 10 ml of the filtrate was collected and split equally into two test tubes. Then add 5ml of 20% sodium hydroxide, filtrate, and lead acid solution into another tube. The presence of phytochemicals was verified by an appearance of yellow when either of the filtrate received the reagent application. Five milliliters of fresh water and half a gram of an extract worked well together. The mixture was gradually heated. Saponins were present because of foaming that persisted even after heat. One centiliter of chloroform was used to dissolve around 0.1 g in the extract. The combination was given the same amount of form addition of acetic anhydride. To create the liquid in the test tube, a couple of drops of H₂SO₄ have been added at finality. Terpenes were detected by changes in color from violet to pink-red.

3. Results

Without a doubt, MP and its curative properties have provided efficient primary healthcare for a variety of illnesses all over the world. The phytochemical elements of MP used to treat COVID-19 were discovered in this study. The discovered MP was divided into two groups depending on how they were used for treatments as shown in (Figure 1) boiling Eucalyptus. Leaves resulted in the steam vapor breathed, whereas boiling a combination of main ingredients resulted in juice.

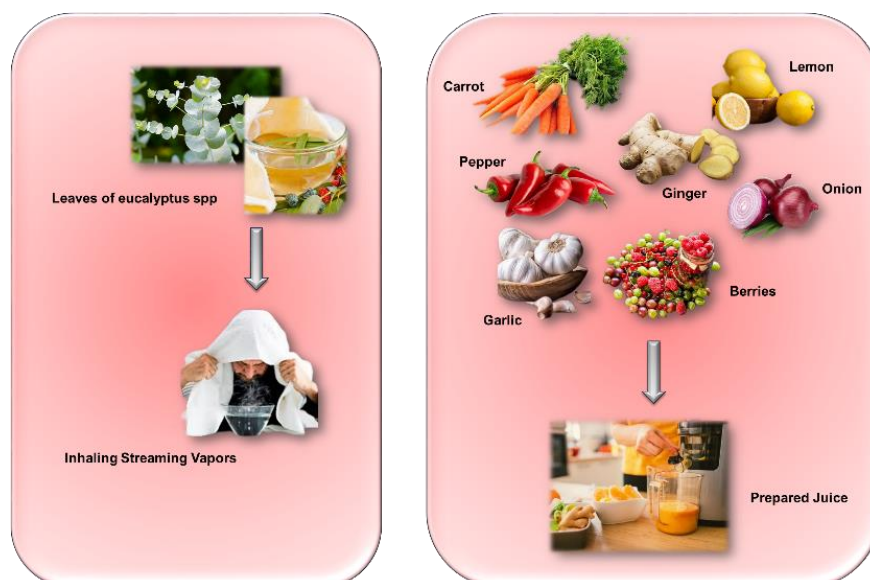


Figure 1: Identification of herbs and concoctions used in COVID-19 prevention

Based on ethnomedicine research, Eucalyptus leaves contain a fragrant antimicrobial and antibacterial oil, and stimulant properties. The practitioners suggested covering the steam vapors with a head cushion, covering the leaves with boiling water and treating COVID-19, asthma, and various respiratory illnesses, or having a bath with a mesh bag packed with leaves from eucalyptus under the boiling water from the faucet. Pharmacological investigations that included cineole as one of these constituents found that it reduces coughing, cures other common respiratory conditions, and aids in phlegm clearance providing weight to this assertion.

According to this, the other mixes used to create juice are regarded as dietary components for enhancing body immunity and treating various illnesses, COVID-19 included. There are a minimum of three anti-COVID-19 drugs available as of therapeutic plant life are now undergoing different testing phases in clinical trials and verification. Covidol, Udanol, and Uzima are the three medications in question. Additionally, secondary metabolites, such as steroids, were discovered by PS of the plant extracts, flavonoids, saponins, fatty acids, and alkaloids (Table 1).

Table 1: Outcomes of the extracted materials' qualitative phytochemical screening

Kind of phytochemicals examined	Hot vaporized plant extracts are breathed.	Utilizing extracts from plants as juice
Tannins	c	c
Steroids	c	c
Flavonoids	c	c
Saponins	c	c
Glycosides	c	c
Alkaloids	c	c
Terpenes	c	c
Fatty acids	c	c

Note: c = current, a = absent

While efforts are being made globally to find a dependable drug or vaccine, COVID-19 may be prevented by simple precautions, including washing your hands with soap and water, hand sanitizer, and disinfectants. The WHO and healthcare professionals also advise the population to use masks to cover their faces and maintain social distancing. On the other hand, many experimental and clinical research investigations on pharmaceuticals and vaccines using MP are currently underway globally to address. The "SARS-CoV-2". Various locations use spices and plants strategically to combat COVID-19.

SAR-CoV-2 consists of three structurally fundamental parts: a single-stranded RNA genome, a membrane formed of lipid bilayers, and external proteins. Chemicals used for Treatment and prevention also rely on how they interact with the viral genome. The inhibition of biological processes to "SARS-CoV-2" is therefore caused by functional groups in chemicals. This indicates that chemical medications are required to treat "SARS-CoV-2" to disrupt the lipid layer, interact with proteins to disrupt particular viral metabolisms, and interfere with viral RNA components to prevent genetic reproduction. Comparatively to previous research, the secondary metabolites found in this investigation have a comparable character that is required to battle COVID-19. Steroids, flavonoids, and fatty acids are often significant possibilities.

"Oleic," "linoleic," and specifically "linolenic" acids are antioxidants that promote consolidation. with a variety of antibacterial, antioxidant, and anti-inflammatory properties as depicted in (Figure 2(a)) represent the structure of quercetin, hesperetin and oleic acid, (Figure 2(b)) represent the structure of keamferol, hesperetin and Linoleic acid and (Figure 2(c)) represent the structure of Catechin, Eucalyptol and Linolenic acid.

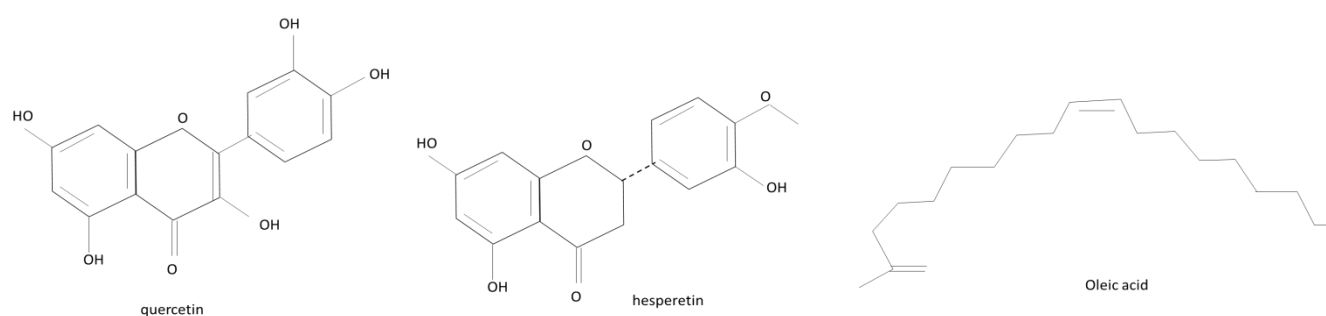


Figure 2 (a): The structure of quercetin, hesperetin and Oleic acid

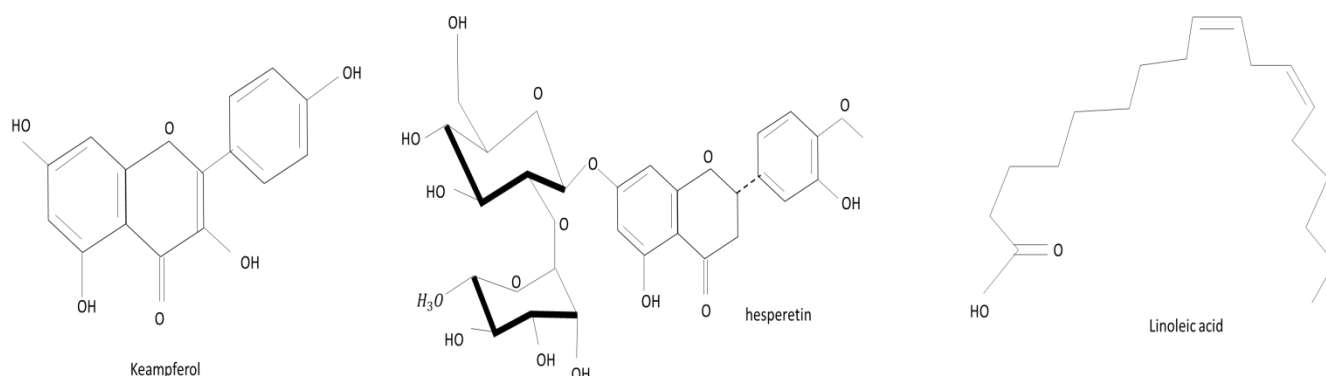
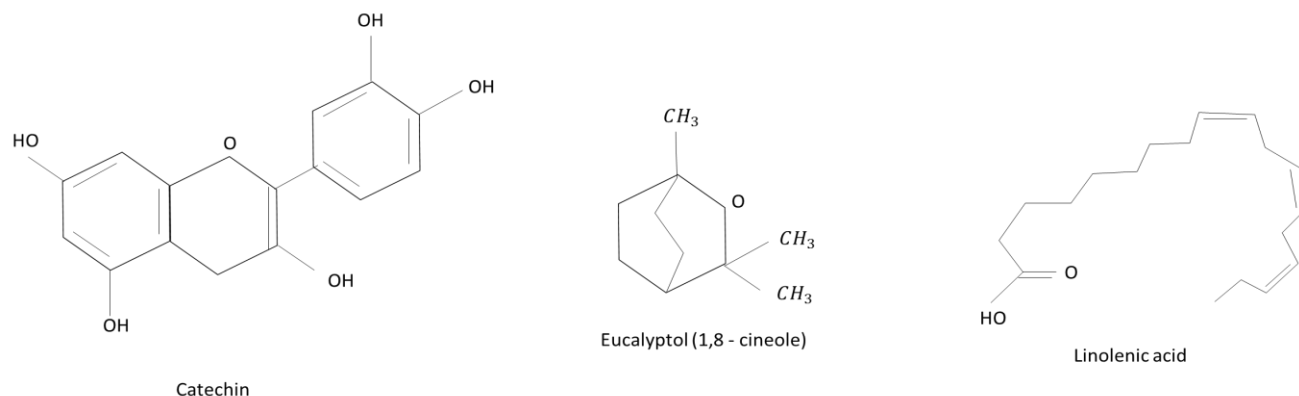


Figure 2 (b): The structure of Keamferol, hesperetin and Linoleic acid**Figure 2 (c):** The structure of Catechin, Eucalyptol and Linolenic acid

According to research, hydrogen bonds between tiny molecules like fatty acids and the main residues of the interface revealed several hydrophobic and H-bond (Hydrogen bond) interactions. Based on docked complex analyses, all phytochemicals often form a firm link with the binding pocket of the “spike protein (S protein)” through robust H-bond interactions. All fatty acids, however, seem to have the potential to act as “SARS-CoV-2” S protein inhibitors *in vivo*. According to research, essential oils come out on top when it comes to chemical compounds’ binding affinities. Due to its strong affinity for viral proteins, essential oils from garlic acid and Eucalyptus may be particularly effective and contribute significantly to these tried-and-true conventional therapies. Regarding this research and further documented pharmacological actions.

Along with a preliminary investigation in animals, plants have also been shown to contain steroid compounds, including androsteroids and progesterone. Plant-produced sterols known as phytosterols are utilized as low-cost building blocks to make variants of orapred. The diverse structural types of phytosterols each have unique health advantages. Steroids, often known as corticosteroid medications, have been widely accessible as trustworthy generic medications for many years. They treat various conditions, including rheumatic allergies, asthma, skin infections, and inflammations, and even aid cancer patients in managing chemotherapy-induced nausea. Important synthetic generic Prelones, like as dexamethasone, are often utilized for managing inflammation in several ailments, including those linked to COVID-19.

Medication shields an body against some of the harm that might result from an overreaction by the immune system to the coronavirus. Covid-19 patients may have inflammation when their immune systems react to an infection, and dexamethasone, a kind of steroid, is officially used to treat this condition. It works by limiting lymphocyte colony formation and blocking neutrophil migration. The generic steroid drug dexamethasone significantly improved the management of COVID-19 by reducing mortality in hospitalized, critically sick patients by up to one-third. This research demonstrates that the typical method of treating COVID-19 is effective since steroid extracts from MP are used in the Treatment. But doing scientific research is crucial.

The secondary metabolites known as image chemicals are part of a diverse class of phytochemicals with many distinct functional categories. They are strong phytocompounds because they provide various health benefits, such as antioxidant, anti-inflammatory, and antibacterial effects. The phytochemicals “quercetin,” C15H12O5”, “hesperetin,” “kaempferol,” and “catechin” (Figure 2), which have been linked to anti-viral activity against “SARS-CoV-2”, are likely available in the extracts under study as well. These phytochemicals were shown to have *in vitro* anti-viral activity as opposed to Respiratory Syncytial Virus

(RSV), para-influenza virus type 3 (Pf-3), and polio-virus type 1.

Additionally, in vivo, tests show that, when compared to other flavonoids, quercetin was the most efficient in fighting the tested virus. Some examples of sources of quercetin are the leaves of radish (*Raphanusraphanistrum*), strawberries, grapes (used to produce red wines), pepper seeds, and grapes. This indicates that all of them may be used in a conventional manner to combat COVID-19. These therapeutic qualities provide a door for further investigation into MP to see if phytochemicals similar to quercetin may be reconciled with anti-viral characteristics to combat "SARS-CoV-2".

4. Conclusion

Among the chemical components that plants biosynthesize and which characterize the potential of MP are fatty acids, alkaloids, phenolics, flavonoids, steroids, and terpenoids. As they may interfere with the viral entry, life cycle, and specific host target, assembly, replication, and photochemical with anti-viral activities have the potential to be very effective in the battle against SAR-CoV-2. This development in the pharmaceutical business was centered on phytochemical extracts from aromatic and MP in the search for new lead chemicals, with a concentration on anti-viral drugs in particular. Consequently, various compounds found in spices, herbal remedies, and essential oils may be employed to create novel anti-viral medications. The recently identified bioactive phytocompounds and MP have a leading role in this regard because of their potent anti-viral activity opposite to "SARS-CoV-2" and other corona viruses. Such phytocompounds and plant extracts inspire collective fundraising initiatives to support researchers' hunt for more phytochemicals for creating COVID-19 anti-viral medications. Continued research into medicinal plants and natural products could lead to the discovery of new compounds with anti-viral properties and immune-boosting effects against COVID-19. By isolating and studying active compounds, scientists may develop effective treatments.

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