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Characterization, potential application and limitation of medicinal herbs in COVID-19: A review

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Abstract

The Severe Acute Respiratory Syndrome-related Coronavirus 2 (SARS-CoV-2) or novel coronavirus (COVID-19) infection has been declared a world pandemic, resulting in a concerning number of deaths, particularly among vulnerable individuals. Despite the fact that a number of therapeutic compounds are being investigated, no effective vaccinations or treatments have been created. Since the COVID-19 outbreak, a variety of traditional herbal medicines have been used to treat and to block the transmission rate we have found that some of the bioactive compounds like Berberine, Mangoflorine, Tinocordiside from giloy, Withaferin (WFA), Withanone, Withanoside from Ashwagandha, Carvacovl, thymol from thyme and Gedunin, Methyl eugenol, Oleanolic acid, Epoxyazadiradione and ursolic from tulsi and neem are effective in controlling the COVID-19.

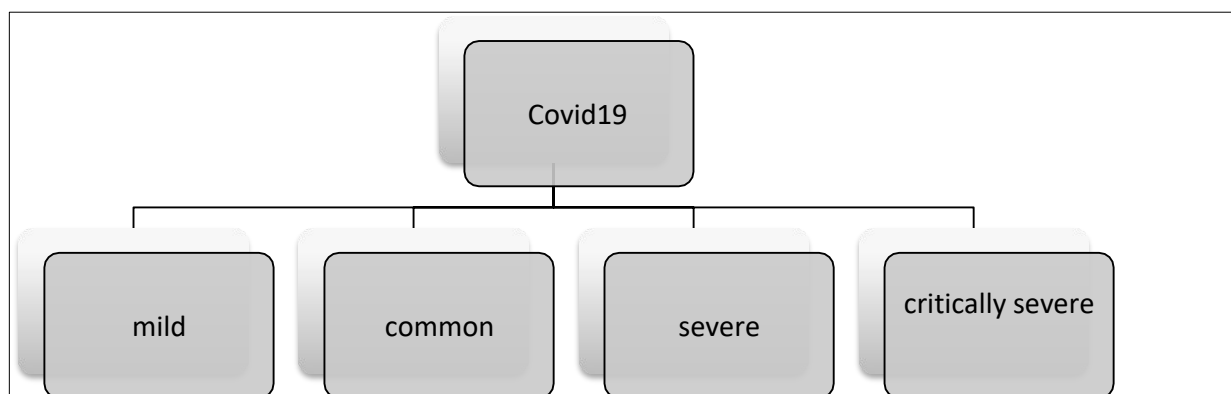
Keywords: COVID-19, medicinal herbs, health benefits, bioactive compounds

Introduction

People today are facing a lot of health problems which have become a common day-to-day problem. Certain diseases like diabetes, thyroid, Parkinson disease, cancer are some of the common problems which most of the people are facing, even during the COVID-19 phase who are suffering from COVID-19 and who had suffered from COVID-19 had faced similar kinds of health problems like fever and breathing problems. As the number of cases of novel coronavirus is rapidly increasing every day worldwide, researchers have intensified their search for effective COVID-19 treatment and vaccine (Singhal *et al.*, 2020) [63]. Multiple clinical trials are taking place around the world, and several drugs and Medicinal Herbs have been identified as potential COVID-19 virus treatments. according to such conditions various types of traditional herbs has come up and shown up some good and better results as COVID-19 is considered these Herbs are Giloy, Ashwagandha, Thyme and tulsi. The different herbal plant extracts and purified molecules may exert their anti-covid actions by direct inhibition of the virus replication or entry. These herbs have good amount of antimicrobial, antiviral, antioxidant, antibacterial, antidiabetic, anti hypertension properties (Marrelli *et al.*, 2021) [65]. These herbs boosts the immunity system. Many studies have been conducted on medicinal herbs, and they have a specific effect on the neurological, circulatory, respiratory, immune, digestive, and urinary systems, as well as the sexual organs, skin, eyesight, hearing, and taste.

COVID-19 And Its Symptoms: The novel coronavirus, also known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is rapidly spreading over the world from its origin in Wuhan, Hubei Province, China (Wang *et al.*, 2020) [53]. The SARS-CoV-2 virus primarily affects the respiratory system, although it also affects other organ systems. In the first case series from Wuhan, China, signs of lower respiratory tract infection included fever, dry cough, and dyspnea (Huang *et al.*, 2020) [18].

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1. Mild: (Rajarshi *et al.*, 2020) [34]
 Disease infestation is mild
 Cannot be detected by an imaging procedure

In the resting state, oxygen saturation is usually less than 93%.
 The pressure of oxygen in arteries is less than 300mm Hg.

2. Common: (Rajarshi *et al.*, 2020) [34]
 Mild to high fever.
 Can be detected using x-rays or CT scans.

4. Critically severe: (Rajarshi *et al.*, 2020) [34]
 Failure of respiratory organs leading to dependency on ventilators.
 Multiple organ failure.

3. Severe: (Rajarshi *et al.*, 2020) [34]
 Stressful respiration, respiration rate higher than 30 minutes.

The patient needs intensive care, monitoring, and treatment.

Medicinal herbs uses

Table 1: Medicinal herbs

S. No.	Name of the Herb	Uses	Reference
1.	Giloy	Used to cure fever, Asthama, skin infections,Jaundice, diarrhea, Gout	Sharma <i>et al.</i> , 2013 [40]
2.	Ashwagandha	Thyroid modulating, immunomodulating, cardioprotective, antidepressant, antibacterial.	Chandrasekhar <i>et al.</i> , 2012 [7]
3.	Thyme	Inhibits the free radicals production by blocking the oxidation of the target molecules, its leaves used in food for flavor and aroma, its oil used to kill the small pest in the field.	Prashanthreddy <i>et al.</i> , 2014 [33]
4.	Tulsi	Used to cure ulcer infections, its powder is used to cure teeth disorders, its leaves relieve cough, cold, and flu.	Kumar <i>et al.</i> , 2010
5.	Ardraka	Its juice is used to cure asthma and cough, useful in treating urticaria and dyspnea.	Pandey <i>et al.</i> , 2012 [58]

Contribution of the Herbs to reduce the post-COVID-19 effects:

Coronavirus have four proteins they are spike protein (S), Membrane protein (m), an Envelope protein (E), and Nucleocapsid protein (N). The spike protein is the major surface protein of the coronavirus it uses the spike protein to enter into the human cells by binding to the receptor cell Human Angiotensin-converting enzyme (Ace2) of human cell and causes the infection. The bioactive compounds present in the herbs prevent the further spread of COVID and may increase immunity (Bhuiyan *et al.*, 2020) [6] currently, there is no conventional treatment for COVID-19. For treatment, only a few antiviral medicines, antibiotics, and anti-inflammatory drugs are employed (Jean *et al.*, 2020) [20]. All prophylactic actions are recommended, such as handwashing with soap and sanitizer, mouth and nose covered with a mask while sneezing and coughing (Ali *et al.*, 2020) [3]. The death pattern of COVID-19 patients demonstrated that early fatalities occurred in older persons, most likely due to low immunity, which increases COVID-19 progression (Li *et al.*, 2020). As a result, strengthening our immune system is important. It's necessary to recommend that people take vitamins to help their immune systems. Antiviral and immunity-boosting properties of several components of medicinal plants are well-known.

Menispermaceae family that belongs to large essential plants. it can be found in all of India's dry and deciduous forests (Sharma *et al.*, 2013) [40].

Description: Shrub, climbing. Stem green when young and covered with dry papery bark. Leaves cordate, petiole pulvinate. Flowers in an axillary raceme, male flowers polysepalous, sepals 3+3. Petals- 6, polypetalous, greenish, stamens- 6, free. Commonly found in all areas

The medicinal plant is rich in phytochemicals such as alkaloids, phytosterols, glycosides, and a variety of other compounds. According to studies, Giloy's major chemical constituent, (alpha) - Dglucan, activates B cells, T cells, and natural killer cells to generate several immune-stimulatory cytokines at the same time, boosting immunomodulatory properties (Chikhale *et al.*, 2020; Cragget *et al.*, 2001) [9, 10]. Giloy leaves are high in vitamin C, thus it's a great supplement to take during COVID-19. If you take Giloy on daily basis, it may help to improve your immunity to covid. By increasing macrophage activity, it also promotes early recovery. Giloykadha, or pills, are used to remove toxins from the body, enhance immunity, and treat skin issues. Anti-cancer, hepatoprotective, antibacterial, anti-inflammatory, hypolipidemic, and hypoglycemia are some of its other properties (Estari *et al.*, 2012; Gheblawi *et al.*, 2020) [14, 15]. The recommended doses of Giloy are: (Tiwari *et al.*, 2014) [50]

Giloy (*Tinospora cordifolia*)

Tinospora cordifolia is a deciduous climbing shrub in the

Table 2: (Kanodia 2022)

S. No	Medicine form	Recommended dose
1.	Giloy Juice	2-3 teaspoon of juice, once or twice a day
2.	Giloy churma	¼ - ½ teaspoon twice a day
3.	Giloy Tablet	1-2 capsule twice a day
4.	Giloy Capsule	1-2 capsule twice a day
5.	Giloy Extract	1 pinch twice a day

The phytoconstituents of *Tinospora Cordifolia* are reported to have antioxidant, antibacterial, antifungal, antidiabetic, hypolipidemic, antimalarial, hepatoprotective, and anticancer activities (Singh *et al.*, 2017) [44]. *Tinospora cordifolia* leaf extract has antibacterial action against gram-positive and gram-negative bacteria, clinically important fungal infections, and malaria parasites (Sharma *et al.*, 2019) [41]. Because of the positive reports of antiviral activity of *Tinospora cordifolia*'s, the efficacy of some natural compounds found in *Tinospora cordifolia* extracts was tested using Insilco pharmacology against three SARS-CoV-2 targets (surface glycoproteins (6VSB, 6M0J) ; RNA dependent RNA polymerase (6M71) ; and Main Protease (6Y84). The structures of many natural compounds found in *Tinospora cordifolia* (Berberine, Tinocordiside, CordifolisideA, Jatrorrhizine, Magnoflorine, Isocolumbin, Sinapic acid, Syringin, and Palmatine) were retrieved from the PubChem database, converted to PDB format, and then minimized for molecular docking using the Chimera software (Yang *et al.*, 2012) [55]. AutoDock Vina (version 1.5.4) was used to analyze the binding efficacy of these natural compounds against the SARS-CoV-2 targets, and the docked protein-ligand complex was visualized using the Chimera and PyMOL v 1.8.2.0 software (Seelinger *et al.*, 2010) [39]. The natural compounds from *Tinospora cordifolia* tested in this study showed therapeutically feasible efficacy against SARS-CoV-2 targets involved in the attachment of the virus to host receptor (6VSB, 6M0J) and its replication (6M71, 6Y84). Mainly Berberine and Isocolumbin showed superior binding affinity against all the four SARS-CoV-2 targets (6VSB, 6M0J, 6M71, and 6Y84) (Sagar *et al.*, 2020) [36].

Thyme (*Thymus vulgaris*)

Thyme has many medicinal, fragrant, and nutritional characteristics, it is one of the most well-known herbs on the planet. The stem is square, the leaves are small in size and simple with complete edges, the color is greenish-grey or silver due to the presence of vines on their surfaces, the flowers are small and medium-sized, with white or somewhat purple color and are carried on terminal bulges, and the flowers are small and medium-sized, with white or somewhat purple color and are carried on terminal bulges, according to the climate and nature of the place in which it is located. Thyme fruits are capsule-shaped, modest in size, and contain many wrinkled black seeds that can be distinguished morphologically by their exterior appearance (Kowalczyk *et al.*, 2020) [22]. Thyme is an evergreen aromatic medicinal herb that belongs to the Lamiaceae family and has a 2.5 percent essential oil concentration (Salehi *et al.*, 2018) [37]. Thyme leaves and its aromatic oil contain 40 active phenolic and terpenoid compounds, the concentrations of which vary according to the types of thyme, including phenols such as Thymol and Carvacrol 51.34% and Pinen, Limonene, Cymen, monoterpene hydrocarbons, oxygenated monoterpenes

(56.53%), sesquiterpene, hydrocarbons (5.04%) and oxygenated sesquiterpenes (1.84%), also four acetophenone glycosides were isolated from the soluble fraction of butanol of thyme extracts and percentage of essential oils in thyme ranges from 0.32-49% (Hoelzl *et al.*, 1994) [17]. Fresh thyme is strong in antioxidants and includes 29 active components, including carvacrol (32%), thymol (30%), and is widely used in traditional medicine to treat ailments such as gastrointestinal disorders, respiratory disorders such as bronchitis, asthma, and cystic fibrosis, among others, Thyme has several mechanisms for treating respiratory diseases, including lowering interleukin, which is activated by lowering nuclear factor B (NF-B) levels (Nabissi *et al.*, 2018) [31]. The fragrant oil of thyme aids in the inhibition of virus reproduction. Other studies have shown that thyme can help strengthen the immune system and that it can be used to explore the interaction between the reticuloendothelial system, the immunological system, and the spleen (Taher *et al.*, 2021) [47, 48]. To study the consequence of thyme in the treatment of respiratory diseases, Sardari *et al.*, had done a questionnaire in the hospital for a group of people infected with COVID-19 and another group who were admitted in an intensive care unit (ICU) the questionnaire also included a group of pregnant women and patients refused to participate in the questionnaire, the samples were divided into the control group (receiving routine medications prescribed by their doctors) and the interaction group (taking 5 ml of thyme essential oil every eight hours for seven days, in addition to the medications prescribed by their doctors).

Based on the results of the questionnaire, the rate of improvement in the group for which thyme was prescribed as medicine was much higher in the control group, and the results showed, after a week of the trial, The results for using thyme oil showed that the fever, dizziness, cough, dyspnea, muscular pain, headache, anorexia, weakness and lethargy, fatigue, and chest wall pain were significantly reduced.

Ashwagandha (*Withania somnifera* (L.) Dunal Family name: Solanaceae

Ashwagandha is also known as "Indian Ginseng" or "Indian Winter Cherry" (*Withania somnifera*, fam. Solanaceae). It is one of the most significant herbs in Ayurveda (India's traditional medical system), and it has been utilized as a Rasayana for millennia for its wide-ranging health effects (Singh *et al.*, 2011) [45]. It has branched erect undershrub 0.31.5m high. Branches terete, leaves 5-10 by 2.5-5cm ovate, subacute, entire, pubescent, base acute. Flowers greenish or light yellow, sessile. Seeds 2.5 mm diam, yellow, somewhat scurfy. Its vernacular names are English: Winter cherry, Sanskrit: Aswagandha, Tamil: Amukara, Telugu: Penneru, Hindi: Asgandha (Gupta *et al.*, 2007) [16]. The plant is used in Ayurveda for its energy, cardio-protective properties, and the treatment of a variety of ailments, including respiratory problems, skin conditions, and neurological disorders (Tetali *et al.*, 2021) [49]. It is recognized for its antiviral, anti-inflammatory, immunomodulatory, antioxidant, antimicrobial, antidiabetic, neuroprotective, analgesic, anti-tumor, anti-aging, anti-arthritis, anti-stress, and immunomodulatory effects. It aids in the maintenance of a healthy mental and physical state, as well as body rejuvenation in cases of impaired health. It also boosts immunity. The recommended Doses of Ashwagandha are: (Singh *et al.*, 2014) [46].

Table 3: (Ranjan *et al.*, 2022) [66]

S. No.	Medicine Form	Recommended Dose
1.	Ashwagandha Tablet	1 tablet twice a day or prescribed by the doctor
2.	Ashwagandha Capsule	1 Capsule twice a day or prescribed by the doctor
3.	Ashwagandha Churma	¼ - ½ tea spoon twice a day or precribed by the doctor

It contains biological active chemical constituents they are Alkaloids such as ashwagandhine, cuscohygrine, anahygrine, tropine, and steroidal compounds such as ergostane type steroidallactones, withaferin A, withanolides A, withasomniferin-A, withasomidienone, withasomniferols A-C, withanone, and others are among the biologically active chemical constituents. Saponins having an extra acyl group, such as sitoindoside VII and VIII, and withanolide, are among the other ingredients (Elsakka *et al.*, 1990) [13]. *W. somnifera* phytochemicals have been shown to have significant antiviral activity against chikungunya, human papillomavirus (HPV), hemagglutinin type 1, and neuraminidase type 1, herpes simplex, hepatitis C virus, parainfluenza-3, SARS-CoV, and SARS-CoV-2 infections (Tripathi *et al.*, 2021) [51]. SARS-S-protein CoV-2's binds to ACE2 receptors on the surface of various types of human cells, primarily lung cells, and gains entry into the host cells. The airway, alveolar and vascular endothelium, and ACE2 receptor-expressing lung macrophages are the primary targets of the Coronavirus. The respiratory alveolar cells produce ACE2 at a higher rate, making them the main entry point for SARS-CoV-2 into the human host (Gheblawi *et al.*, 2020) [15]. Many Clinical and experimental trials are being done to determine the most effective COVID-19 therapy regime; preventing viral particle entry into the host cell by inhibiting S-protein interactions with the host ACE2 receptor is an effective technique for curing COVID-19. Natural chemicals including withanone, WFA, caffeic acid phenethyl ester, and other biologically active compounds can interact with SARS-host CoV-2's cell receptor (ACE2) and its primary protease (Mpro) and according to recent discoveries, phytochemicals found in *Withania somnifera* can be used to develop effective COVID-19 treatments (Kumar *et al.*, 2021) [25]. WFA may interact with S- protein RBD, limiting interactions with host cell receptors, according to molecular docking studies (ACE2) (Balakrishna *et al.*, 2020). Chikhale *et al.*, 2020 [9], reported that Withanoside X, Ashwagandanolide, and Dihydrowithaferin A exhibit strong binding affinities with various essential viral proteins (S-protein). Hence, these phytochemicals can interrupt the essential SARSCoV-2 viral proteins under disease conditions. Hence, withanolides present in *W. somnifera* can be explored as potential biomolecules that interact with SARS-CoV-2 and needs additional investigation as drug candidates to treat COVID-19.

Ashwagandha can be considered safe when consumed orally for up to three months, Ashwagandha's long-term safety is unknown. Ashwagandha at high doses might cause stomach distress, diarrhoea, and vomiting. Liver issues are a rare occurrence. Although ashwagandha is generally safe, some people should not take it unless their healthcare physician has given them permission. Standardized root extract is generally taken once or twice a day in 450–500 mg capsules. (Tetail *et al.* 2020).

Some case studies on Ashwagandha doses for some diseases

Ashwagandha has been found in studies to improve body composition and strength. Healthy men who took 750–1,250

mg of crushed ashwagandha root per day for 30 days developed muscle strength in a trial to find a safe and effective dosage for ashwagandha (Raut *et al.*, 2012) [34].

In a 60-day study of chronically stressed adults, those who received the highest dose of standardised ashwagandha extract saw a 17 percent reduction in LDL (bad) cholesterol and an 11 percent reduction in triglycerides (Abedon *et al.*, 2008) [1].

In a 60-day study of 64 stressed people, those who took 600 mg of high-concentration ashwagandha extract per day experienced a 79 percent reduction in severe depression, compared to a 10% increase in the placebo group (Chandrasekhar *et al.*, 2012) [7].

Tulasi: (*Ocimum sanctum L.*) Family: Lamiaceae

Tulasi (*Ocimum sanctum L.*) in Hindi or Tulasi in Sanskrit (holy basil in English) is a widely used culinary and restorative fragrant plant from the Lamiaceae family native to the Indian subcontinent and has been used in Ayurvedic medicine for over 3000 years. Tulsi is a common herb found throughout the Indian subcontinent. The plant can be found growing wild in tropical warm climates. The plant grows to a height of 2 to 4 feet. Winter is the blossoming season (December to February). The leaves of Tulsi have a pungent scent and astringent flavor. Tulsi leaves contain biologically active chemicals such as ursolic acid, luteolin, and apigenin, which can be isolated. Although leaves are the most commonly used part, blossoms, seeds, and roots are also useful. The dark variant, also known as Krishna Tulsi, and the light version, also known as Rama Tulsi, are the two principal types of Tulsi. The Thai Basil is a close relative of the Tulsi. Unlike the slightly hairy Tulsi, this is smooth and hairless. It is a herb that is believed to help with respiratory problems. The decoction made from honey, ginger, and Tulsi leaves is effective in treating bronchitis, flu, and asthma. During the blustery season, when illnesses like jungle fever and dengue ravage the country, the leaves of the Tulsi plant are extremely beneficial. The juice extracted from Tulsi leaves is the most effective way to reduce fever. Tulsi is an essential fixing in the preparation of Ayurvedic hack syrups. It is particularly beneficial in the treatment of colds and influenza (cargg *et al.*, 2001). Tulsi lowers overall cholesterol levels. As a result, it is beneficial to people with heart disease. It's been used to treat stomach problems, coughs, colds, malaria, and headaches. It has immunosuppressive characteristics. Antiviral, antibacterial, antitubercular, antifungal, and antimalarial activities are all present (Warrier *et al.*, 1995) [54]. Recommended doses of tulsi (Mohan *et al.*, 2011) [28].

Because of the antiviral activity of *Ocimum sanctum* Kumar H.S *et al.* done a research on natural compounds of Tulsi against SARS-COV-2 proteins. Molecular docking tools were used to test the binding efficacy of natural tulsi compounds against three key SARS-CoV-2 targets: 1) the surface glycoprotein (6VSB) responsible for viral attachment, 2) the RNA dependent RNA polymerase (6M71) responsible for viral replication, and 3) the main protease (6Y84) responsible for viral replication. Methyl eugenol, oleanolic acid, and ursolic acid strongly bind with SARS-CoV-2 surface spike glycoprotein and RNA polymerase. Epoxyaza-diradione, Gedunin, Methyl eugenol, Oleanolic acid, and Ursolic acid were found to have high binding efficacy against SARS-primary CoV-2's protease. SARS-CoV-2 surface spike glycoprotein and RNA polymerase were highly bound by methyl eugenol, oleanolic acid, and ursolic acid. Epoxyaza-

diradione, Gedunin, Methyl eugenol, Oleanolic acid, and Ursolic acid were found to have high binding efficacy against SARS-primary CoV-2's protease. The natural chemicals from

tulsi outperformed the conventional pharmaceuticals in terms of binding efficacy.

Different Herbs and their BioActive compound Structures responsible in reducing COVID-19 effect:

Goy:

Biactive compound: Berberine, Mangoflorine, Tinocordiside. (Sagar *et al.*, 2020) [36].

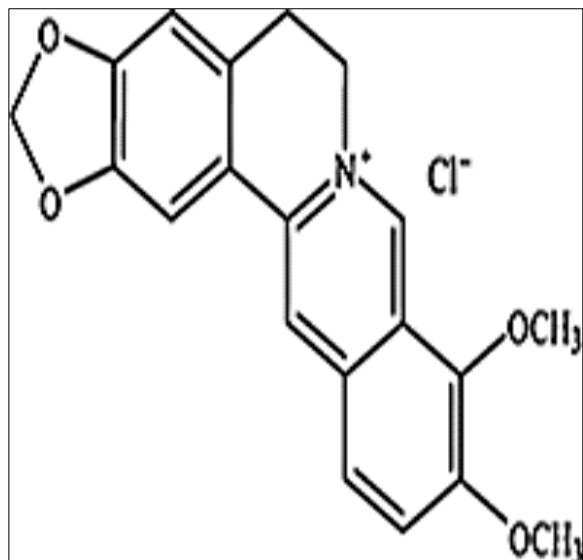


Fig 1: Berberine (Lei *et al.*, 2011) [26]

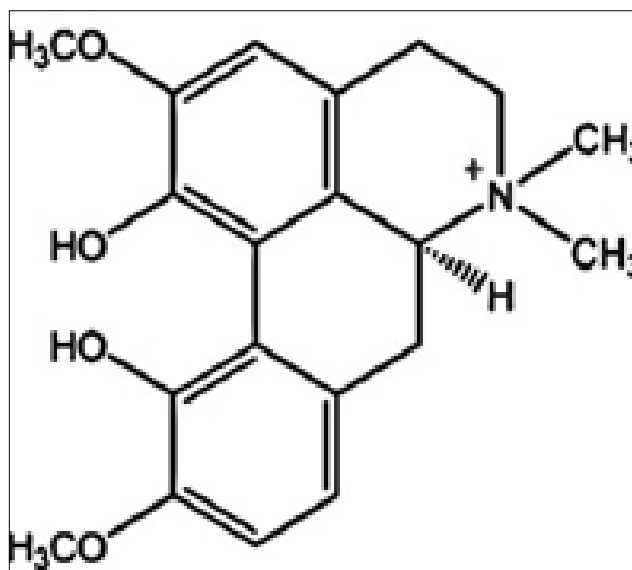


Fig 2: Mangoflorine (Hung *et al.*, 2007) [19]

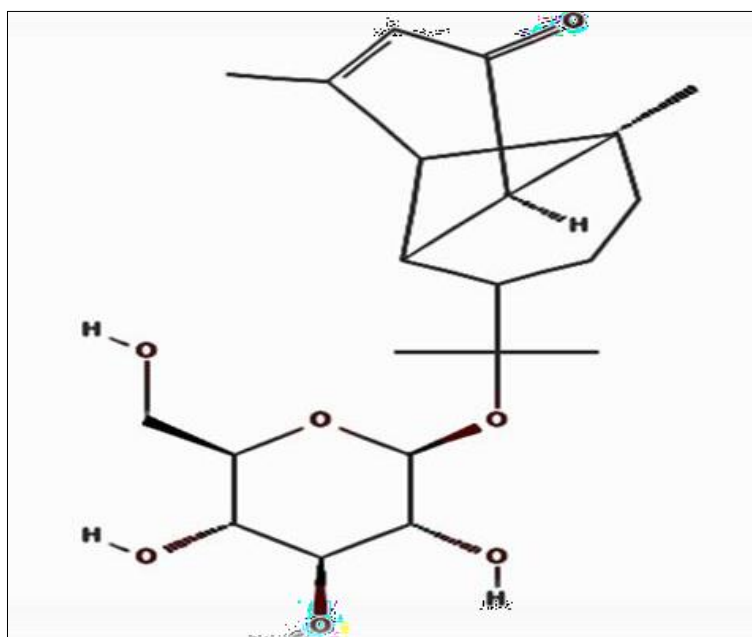


Fig 3: Tinocordiside (Shree *et al.*, 2020) [43]

Ashwaganda

Bioactive compounds: Withaferin (WFA), Withanone, Withanoside. (Dhawan *et al.*, 2021) [11].

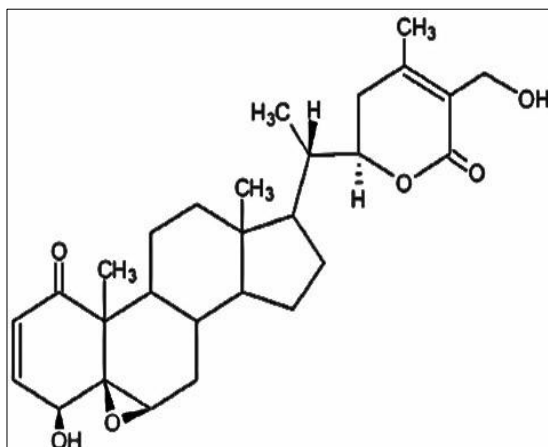


Fig 4: Withaferin A (Vaishnavi *et al.*, 2012) [52]

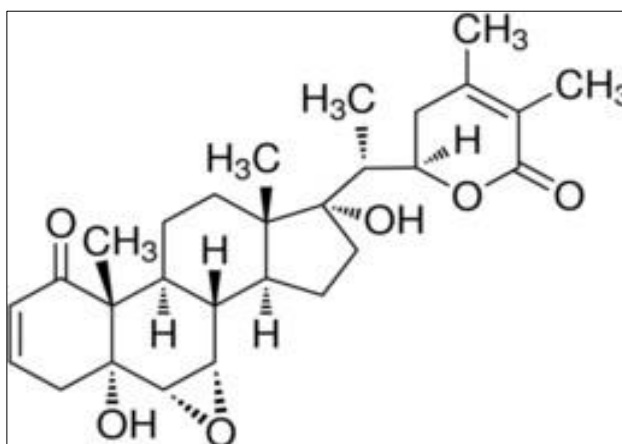


Fig 5: Withanone (Vaishnavi *et al.*, 2012) [52]

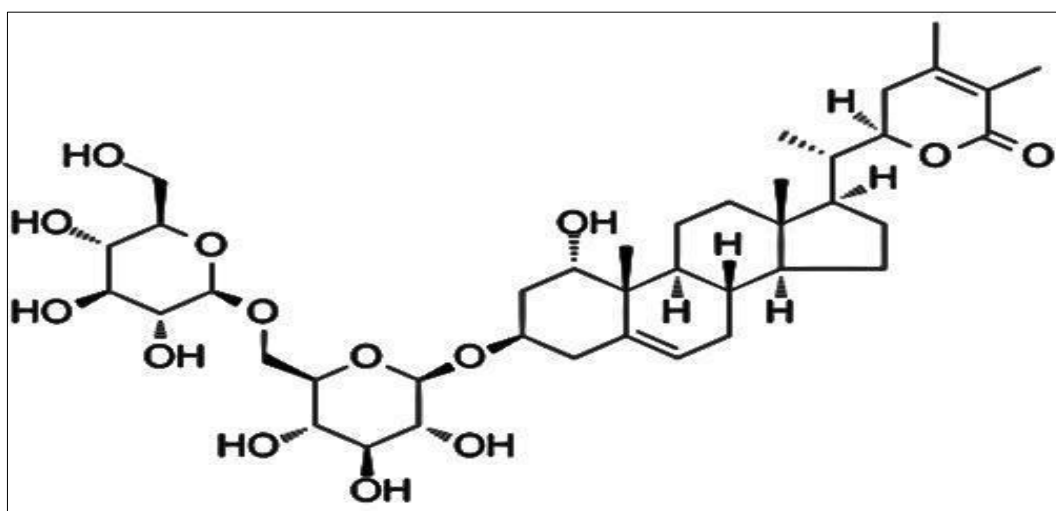


Fig 6: Withanoside (Dhawan *et al.*, 2021) [11]

Thyme

Bioactive compounds: Carvacovl, thymol (Taher *et al.*, 2021) [47, 48]

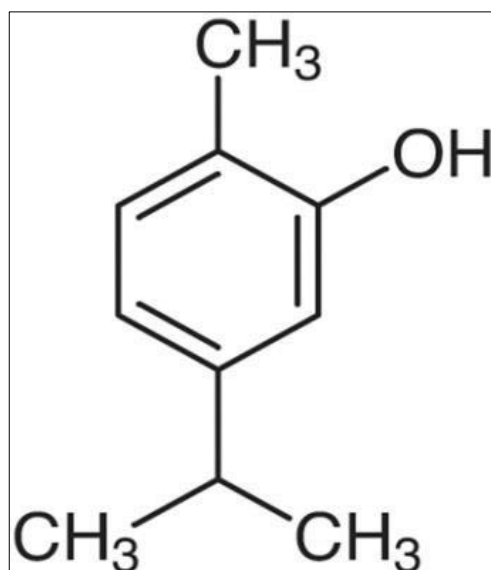


Fig 7: Carvacol (Shiyab *et al.*, 2012) [42]

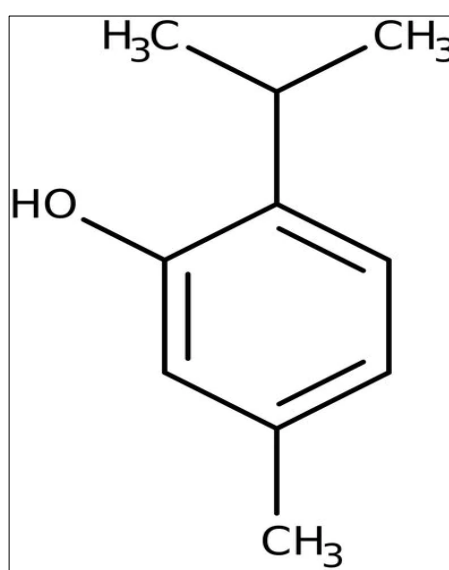


Fig 8: Thymol (Shiyab *et al.*, 2012) [42]

Tulsi and Neem

Bioactive compounds: Gedunin, Methyl eugenol, Oleanolic acid, Epoxyazadiradione and ursolic (Kumar *et al.*, 2020) [23].

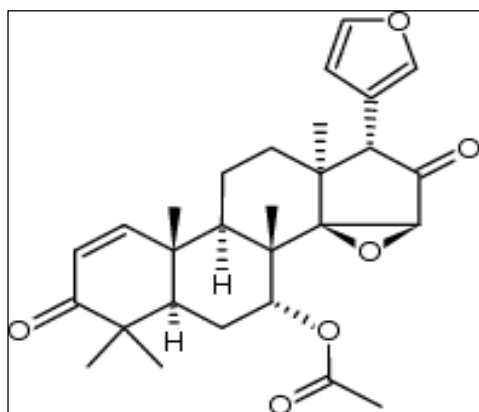


Fig 9: Epoxyazadiradione (Kumar *et al.*, 2020) [23]

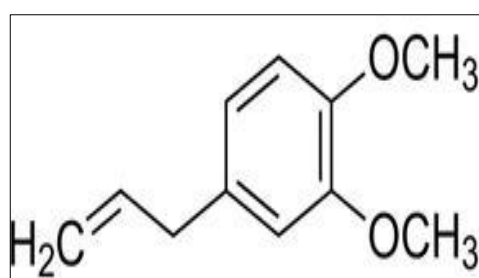


Fig 10: Methyl eugenol (Kumar *et al.*, 2020) [23]

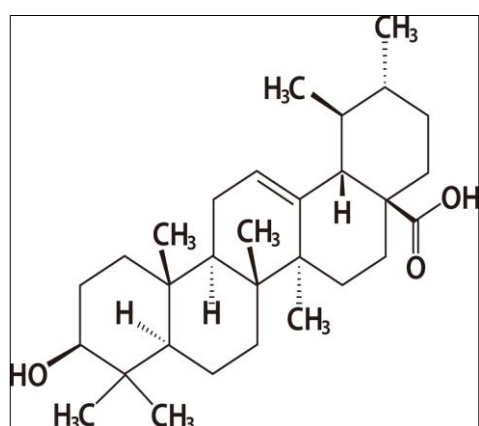


Fig 11: Ursolic (kumar *et al.*, 2020) [23]

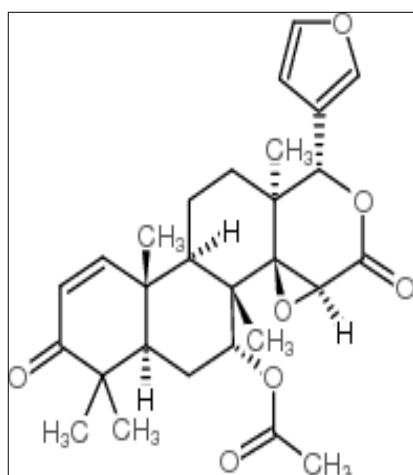


Fig 12: Gedunin (Kumar *et al.*, 2020) [23]

Toxic effects for the use of herbal medicine

Herbal medicines can cause kidney failure and liver damage in some consumers because of the over dosage. Herbal medicines can be mistakenly thought to be completely safe because they are 'natural' products. This is not always correct. Adverse effect happens if a person unknowingly takes the wrong herb or combination of substances in the wrong amount or at the wrong time, they risk harming themselves (Ekor 2014) [12]. This could include persons who take herbal medicine to achieve a certain effect (such as getting 'high' or reducing unpleasant feelings) but are unaware of the drug's strength or contents. A large number of people still use herbal medicines, and some people use herbal medicines in conjunction with standard allopathic medications, particularly in cases of diabetes, hypertension, thyroid disease, and other chronic diseases for which the patient is on long-term or lifelong treatment. Numerous commercial websites on the Internet claim that herbal remedies have no negative effects. There are no formal restrictions for herbal practitioners or corporations promoting herbal goods in undeveloped and developing countries. People are drawn to such businesses and begin taking herbal remedies that are said to be free of adverse effects.

Medicinal applications

Herbal plants widely used in traditional aurvedic medicine because of its biological activities like anti-inflammatory, immunomodulatory, anti-oxidant, anti-diabetic, anti-periodic, anti-spasmodic, anti-neoplastic activities, anti-stress, anti-leprotic, anti-malarial, hepatoprotective, anti-allergic, and anti-arthritis activity, as well as a variety of other therapeutic qualities.

The juice of Giloy stem is useful in diabetes, dyspepsia, vaginal and urethral discharges (Bharathi *et al.*, 2018) [56].

The dried fruit powder of giloy is used as a tonic and in the treatment of jaundice and rheumatism when blended with ghee or honey (Treadway *et al.*, 1998) [57]. Giloy is also used to cure fractures and eye diseases and also reduces radiation-induced tissue damage (Pandey *et al.*, 2012) [58]. Thyme has been used as an antiseptic, antibiotic, medicine, astringent, medical drug, carminative, disinfectant, medicinal drug, tonic, and carminative. Thyme can help with a variety of intestinal diseases and infestations, including hook worms, gram-positive and gram-negative bacteria, and gram-negative bacteria. Thymol, the active ingredient, is effective against coccid bacteria. Thyme may also help to enhance liver function and stimulate appetite. It will be used to treat infections of the cartilaginous tube, bronchial tubes, and urinary tract (Amiri *et al.*, 2012) [59]. Thyme is beneficial in the treatment of inflammation and laryngitis. Thymol, the major component of thyme's volatile oil, has antibacterial properties against coccid bacteria. It's used to treat oily skin, sciatica, acne, dermatitis, skin conditions, and insect bites, among other things. The separate varieties, thymol, "red thyme oil," and linalool, for its incredibly light gentle effect and antiviral capabilities, are utilised in aromatherapy. "White thyme oil," a rectified product, is also utilised, and it is gentler on the skin. Thyme cures bites and stings, as well as neuralgia and rheumatic aches and pains, when applied to the skin (Hosseinzadeh *et al.*, 2015) [60]. Tulsi has a calming and strengthening effect on the neurological system. It helps to keep the heart healthy. It serves as an appetiser while also aiding digestion. It aids in the release of digestive enzymes and helps to avoid flatulence. Tulsi, which has detoxifying

capabilities, cleanses the blood of any pollutants that may be present. Tulsi has the potential to protect you against radiation poisoning. It has also been suggested that Tulsi has anti-cancer effects. There is a popular idea that swallowing a Tulsi leaf everyday would prevent you against cancer. Apart from its religious importance, it has significant medical value and is a key ingredient in Ayurvedic medicine. Tulsi, which has a powerful perfume and a bitter flavour, is known as "the elixir of life" because it enhances lifespan (Bhadra *et al.*, 2020)^[61]. In Indian systems of medicine, *Withania somnifera* is one of the main botanical components of geriatric tonics. This plant is said to have significant aphrodisiac, rejuvenative, and life-prolonging effects in the traditional school of medicine Ayurveda. It has broad animating and regenerating properties and is used to treat nervous weariness, memory problems, sleeplessness, tiredness potency concerns, skin problems, and coughing, among other things. It enhances memory and learning abilities (Verma *et al.*, 2012)^[62].

Some possible reasons for the toxic effect of herbal medicines are

Self-Treatment

Herbal medicines can be acquired without a prescription and are widely available in the market. These products are promoted in the media as a miraculous therapy with no adverse effects to attract those who are tired of side effects or have given up hope of being cured. Patients who choose to play it safe are enticed in such a way that they are allowed to continue using their current medications while receiving herbal treatment. Even people who are concerned about their health begin herbal treatment to stay healthy, demonstrating the adage "prevention is better than cure." As a result, a significant number of people are drawn to herbal medications and begin self-treatment (Barrueto *et al.*, 2016)^[5].

Sub-standard product

There are a lot of low-quality herbal products on the market. The reason for this is that these products are not properly checked for quality before being marketed. Some contain a less active substance, while others contain none at all, as a result of the collector's faulty identification of the plant, the use of adulterant instead of the genuine plant, or bad storage of plant material, and it loses its efficacy. Non-herbal materials, minerals, heavy metals, and the addition of a specific medicinal medication are sometimes found in herbal medicines that are not listed on the label. They may occasionally contain poisons and pesticides, which is far riskier and one of the most common causes of adverse effects after taking an herbal medicine (Jennifer 2002)^[21].

Improper Intake

Allopathic drugs are only available after lengthy testing and trials, and their dosage is determined by the patient's age and weight. The pamphlet contains a list of all possible side effects. In the case of herbal medicines, however, no such protocols are followed. Some herbal medicines are classified as dietary supplements, with no recommended dosage. No measuring cup or spoon was provided with the medicine as in the case of allopathic syrups. Typically, the same dose is given to people of all ages and weights. Companies who sell these products mislead individuals by claiming that their product is completely devoid of side effects. Even though no time limit is specified, some people continue for months or years, which can be damaging to human health in the long run

(Barrett *et al.*, 1992)^[4].

Conclusion

For the management of COVID-19 some of the bioactive compounds of the medicinal herbs are useful as they also blocks the transmission of the virus. some of the bioactive compounds like Berberine, Mangoflorine, Tinocordiside from giloy, Withaferin (WFA), Withanone, Withanoside from Ashwagantha, Carvacovl, thymol from thyme and Gedunin, Methyl eugenol, Oleanolic acid, Epoxyzadiradione and ursolic from tulsi and neem are effective in controlling and management of the COVID-19.

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