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Study on Antiviral Activities of some Immunity Boosting Herbs- Extraction, Encapsulation and Development of Functional Food

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Abstract:- Among infectious diseases, viral diseases in particular, remain the leading cause of death in humans globally. Based on this rationale, a review work was performed, which helped to identify a large number of plant species harbouring antiviral molecules. These herbal sources like oregano, sage, fennel, lemongrass, giloy, basak have been reported individually to act as antiviral agent. This review includes such plant species exhibiting antiviral properties. We have selected those herbs which can prevent diseases like influenza, SARS, SARS-COV etc.

Keywords:- *Viral Diseases, Antiviral Properties, Infectious Diseases, Herbal Sources.*

I. INTRODUCTION

What is Phytotherapy, and how does it work? The use of plants or herbs as medications to treat or prevent diseases in humans and animals is known as phytotherapy. Several studies have indicated that herbal extracts can be used as an antiviral medicine in animal feed or as a prophylaxis and cure. Antiviral properties of various sources are thoroughly researched Herbs are a less expensive and safer alternative, and their use may help to modulate the immune system and prevent viral diseases such as SARS, COV-2, influenza, and other viral infections. Herbal plant extracts, specific plant part extracts (such as roots, stems, bark, flowers, fruits, and seeds), dietary supplements, and nutraceuticals are all used to treat a variety of ailments, from minor to severe. According to studies, one-quarter of regularly used medicines contain plant-derived chemicals. Infectious diseases that are emerging or re-emerging continue to represent a constant hazard to the human population. A wide range of medicinal plants have been investigated for their potential to combat deadly viral infections. Aspirin, morphine, and taxol are examples of drugs derived from chemicals extracted from plant sources. Antiviral qualities of herbal sources have been thoroughly studied, and with this review, we've attempted to compile information on such plants with antiviral potential. Chickenpox, influenza, skin rash, hepatitis, bronchiolitis, acquired immunodeficiency syndrome, liver infection, and a variety of other disorders are among the ailments they induce in humans. Virus particles enter the body of any living system, and if they overwhelm the body's system, it's very impossible to stop them from spreading throughout the body. For their repeated replication, they lead the host metabolic path; this makes their treatment difficult. Fortunately, it's now widely recognised that viruses have a distinct mechanism of replication that can be easily targeted. Its objective is to assemble and to highlight in the context of prior art patents, patent applications, non-patented technology and commonly available mental subject matter information on different plant formulations of antiviral properties. Extraction and encapsulation of the herbs Giloy, Oregano, Fennel, Sage, Lemongrass, and Basak leaf are explored due to the presence of bioactive chemicals.

II. BIOCOMPONENTS OF HERBS

HERBS	SCIENTIFIC NAME	BIOCOMPONENTS
GILOY	*Tinosporacordifolia*	Columbin, tinosporaside, jatrorhizine, palmatine, berberine,tembeterine, tinocordifolioside, phenylpropene disaccharides, choline, tinosporic acid, tinosporal, tinosporon, and tinosporide [1]
OREGANO	*Origanumvulgare*	Polyphenols, monoterpenoids monoterpenes, carvacrol, thymol, p-cymene, γ-terpinene, caryophyllene, spathulenol, germacrene-D, β-fenchyl alcohol and δ-terpineol. [2]
FENNEL	*Foeniculumvulgare*	Trans-anethole, estragole, fenchone, limonene, 1-octen-3-ol, polyphenols, rosmarinic acid and luteolin. [3]
SAGE	*Salvia officinalis*	Camphor, Thujone, 1,8-Cineole, α-pinene,β –Thujone, α-Humulene, β-Caryophyllene and borneol. [4]
LEMONGRASS	Cymbopog*on*	Citral, z-citral, borneol, estragole, methyleugenol, geranial acetate, geraniol, beta-myrcene, limonene, piperitone, citronellal, carene-2, alpha-terpineole, pinene, farnesol, proximadiol, and cymbodiacetal.[5]
BASAK	*Adhatodavasica*	Alkaloids, tannins, saponins, phenolics, flavonoids. The most important is vasicine, a quinazoline alkaloid. [6]

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III. EXTRACTION PROCEDUREOF ANTIVIRAL HERBS

A. Procedure of extraction from Giloy

First, 5 kilogramme of fresh Giloystem, about 1.6-2.0 cm thick, was sliced into pieces (Approx 1.5-2.0 inches length). These bits were then completely mashed and turned into a slimy paste. In a stainless steel vessel, the mass obtained was soaked overnight for 12 hours in 4 times of potable water. The bulk was extensively macerated in water with hands for about an hour the next morning, then filtered slowly through a clean cotton cloth folded four times. The liquid was left undisturbed for four hours before the supernatant liquid was carefully sucked out. The white and smooth starchy residue that fell at the bottom was collected into an SS tray, air-dried under a running fan, and kept in sterile dry airtight glass jars.[7]

Preliminary phytochemical analysis of Tinosporacordifoliastem's 50 percent ethanolic extract revealed alkaloids, amino acids, resins, flavonoids, phytosterols, saponins, steroids, tannins, terpenoids, and reducing sugars. Hexane, chloroform, ethyl acetate, and butanol were used to fractionate the dried 50 percent ethanolic extract. The bioactivity of all the fractions was then determined, and the bioactive fraction was further sub fractionated using a TLC plate.

B. Procedure of extraction from Oregano

Oregano extracts have been created using a range of extraction procedures, resulting in a variety of extracts with varying phytochemical compositions. The principal components to be luteolin 7-O-glucoside (20.88%), rosmarinic acid (14.62%), luteolinO-glucuronide (12.48%), and apigenin-7-O-glucuronide (12.48%) in a hydroalcoholic extract where the ratio of methanol and water is 80:20. (5.78 percent). Carvacrol, linalyl acetate, thymol, and cis-sabinene hydrate are among the primary phytochemicals found here.

Using 2-L steam distillation equipment, oregano essential oil is extracted using the classic steam distillation method. 1.25 minutes, 2.5 minutes, 5 minutes, 10 minutes, 20 minutes, 40 minutes, 80 minutes, 160 minutes, 240 minutes, and 360 minutes were tested in three duplicates. The DTs were calculated from the start of the distillation, when the first drop of essential oil was deposited, until the end, when the heating was switched off, the vapour pressure was lowered, and the Florentine jar (a separator) was withdrawn from the apparatus. The oil was weighed on an analytical balance and stored at –5 degrees Celsius until analysis. The oil yield was determined based on 100 g of dried oregano leaves yielding 1 g of oil. [8]

C. Procedure of extraction from Sage

The ability of the extracts to scavenge the free radical DPPH (1,1-diphenyl-2-picrylhydrazyl) in vitro was determined. To determine the effectiveness of the extraction of antioxidative compounds from sage (Salvia officinalis L.) by pressurized hot water extraction, ultra sonication-assisted methanol extraction, hydro distillation, and maceration with 70% ethanol. The most effective extraction method was found to be pressurized hot water extraction, followed by 70 percent ethanol maceration, hydro distillation, and ultra sonication-assisted methanol extraction. In addition to the whole extract, rosmarinic and carnosic acids, as well as carnosol and methyl carnosate, were studied in depth. Reversed-phase high-performance liquid chromatography was used to examine the extracts (RP-HPLC). The identification of chemicals was validated by combining RP-HPLC with electrospray ionisation and mass spectrometry.[9]

D. Procedure of extraction from Fennel

To determine the yield, composition, and organoleptic properties of the extract, ground fennel seeds were extracted with supercritical CO2 (SC-CO2) at a flow rate of 0.2 kg CO2/h under varying extraction conditions. The extracted fennel seed oil was compared to fennel seed oil obtained using hydro distillation. Trans-anethole (68.6–75.0 percent) and (62.0 percent), methyl chavicol (5.09–9.10 percent) and (4.90 percent), fenchone (8.40–14.7 percent) and (20.3 percent) were the main components in the SC-CO2 extracts and hydro distilled oil, respectively. The optimal SC-CO2extraction conditions for the selected herb material (high percentage of trans-anethole, with significant content of fenchone and reduced content of methyl chavicol and co-extracted cuticular waxes) were found to be: pressure, 100 bar; temperature, 40°C; extraction time, 120 min, with pressure varying from 80 to 150 bar and temperature varying from 40° to 57°C. Hydro distilled oil had a less pronounced fennel seed aroma than SC-CO2 extracts, according to organoleptic studies. [10]

E. Procedure of extraction from Lemongrass:-

Steam distillation is used to obtain lemongrass oil. Oil recovery from grass takes roughly four hours and ranges from 0.5 to 0.8 percent. In this approach, 150 grammes of fresh lemongrass were placed in a 1 litre round bottom flask with 250 millilitres of water. The flask was heated and equipped with a rubber stopper connected to the condenser. During the condenser, water at 0°C flowed counter-currently to condense the ensuring steam. When the water temperature hit 100°C, the lemongrass began to boil, releasing the essential oil. The lemongrass essential oil produced from the leaf combined with the water vapour when the lemongrass was cooked.

During the condenser, both flowed through, and the vapour was condensed into a liquid. Cooling was made possible with the use of an ice block, and volatilization of the essential oil was avoided. A 500ml beaker was used to collect the condensate, which was then placed into a separating funnel. Two layers of oil and water resulted as a result of this process. The separating funnel's faucet was opened to instantly drain the water through the oil, which was collected in a stoppered bottle. To prevent the essential oil from evaporating, the bottle was tightly capped. [11]

F. Procedure of extraction from Basak Leaf

The alcohol extract from herbal basak tea contains 0.67 percent crude alkaloids, according to the analytical data, and the isolated tracheal chain experiment with this extract revealed a minor relaxation effect when compared to the usual histamine medication. The crude alkaloids and other extracts (petroleum ether extract, alcohol extract, and hot water extract) demonstrated modest inhibition against various bacteria in varying degrees.

Fresh Adhatodavasica (basak) leaves weighing 2.0 kg were harvested, cleaned, and chopped into little pieces. Blending then caused it to burst. At a temperature of 30 - 32°C, the blended leaves were left to ferment in a thick layer for 18 hours. After fermentation, the material was sprayed on trays and dried for 4 to 6 hours using air circulation. To improve the surface area of the partially dried tea, it was crushed into small particles and dried for 4 hours in a hot air dryer at 65-70°C. The final weight was 712 grams. [12]

IV. ENCAPSULATION METHODS OF HERBS

A. Encapsulation procedure of Oregano

Oregano essential oil (OEO) was encapsulated in chitosan nanoparticles in this work using a two-step technique that included an oil-in-water emulsion and ionic gelation of chitosan with sodium tripolyphosphate (TPP). Fourier transform infrared (FT-IR) spectroscopy, UV–vis spectrophotometry, thermogravimetric analysis (TGA), and X-ray diffraction (XRD) techniques were used to demonstrate the efficacy of OEO encapsulation. Scanning electron microscopy (SEM) and atomic force microscopy revealed that the nanoparticles had a consistent distribution and a spherical form with a size range of 40–80 nm (AFM). When the initial OEO concentration was 0.1–0.8 g/g chitosan, the encapsulation efficiency (EE) and loading capacity (LC) of OEO-loaded chitosan nanoparticles were around 21–47 percent and 3–8%, respectively, as evaluated by TGA method. In vitro release experiments revealed a burst action followed by a gradual release of the medication. [13]

B. Encapsulation procedure of Fennel

The current work investigates the freeze-drying method for encapsulating fennel oleoresin using binary and ternary mixes of Gum Arabic (GA) mixed with modified starch, maltodextrin, and chitosan. The capacity of the final combinations to encapsulate the principal constituents of fennel oleoresin was assessed based on their microencapsulating efficiency and storage stability. The encapsulating mixture with the most storage stability, microencapsulating efficiency (74.88%), and redispersibility (2.744m) was created by partially replacing Gum Arabic with modified starch. The features of the initially generated emulsions (emulsion mean diameter and stability) influenced the moisture content and redispersibility of the freeze-dried final products. Fennel oleoresin components (fenchone, estragole, trans-anethole, and D-limonene) were encapsulated and protected by GA in mixes throughout storage. [14]

C. Encapsulation procedure of Lemongrass

Known for its broad spectrum of antimicrobial activity, essential oil lemongrass (Cymbopogoncitratus) has been microencapsulated by simple co-operation. Crossinked with glutaraldehyde as the wall shaping polymer was polyvinyl alcohol (PVA, 78.000 Da and 88 mol percent hydrolysis degree). The effect of the microcapsule stirring rate and fraction of oil volume has been evaluated. In order to prevent microcapsule agglomeration during process, sodium dodecyl sulphate (SDS) and polyvinyl pyrrolidone were tested. Microcapsules ranging in size from 10 to 250 m were developed depending on the testing conditions. When SDS was employed at 0.03 wt. percent, microcapsules without agglomeration were obtained. The composition of the encapsulated oil and its antimicrobial characteristics were determined, showing that the microencapsulation process did not deteriorate the encapsulated essential oil. [15]

D. Encapsulation procedure of Basak

The principal active ingredient of Adhatodavasica, an Indian traditional plant, is Vasicine, an aquinazolinealkaloid that has antiasthma properties in the treatment of asthma condition. The goal of this study is to see if the pyrroloquinazoline alkaloid vasicine can be retained in Adhatodavasica raw herb and formulations after microencapsulation and extrusion using a high-performance liquid chromatography technology. When compared to the initial vasicine content of hot air-dried Adhatodavasica leaf powder, the higher retention, 73.18 percent, of vasicine in gum acacia encapsulated Adhatodavasica leaf powder was found (378 ppm). In maltodextrin encapsulated, gum acacia encapsulated and extruded, raw herb spray dried, and raw herb extruded, the retention percentages of vasicine were determined to be 69.57 percent, 64.72 percent, 49.50 percent, and 44.24 percent, respectively. This research will aid functional food product makers in utilising microencapsulated Adhatodavasica leaf powder in their formulations to withstand high temperatures and pressure.[16]

E. Encapsulation procedure of Sage

Shoot tips from Salvia officinalis shoot cultures were encapsulated in 2 percent or 3 percent (w/v) sodium alginate and complexed with 50 mM calcium chloride. The synthetic seeds were cultivated for 6 weeks on half-strength MS medium supplemented with indole-3-acetic acid (0.1 mg/l) and solidified with 0.7 percent agar, either immediately or after 6, 12, or 24 weeks of storage at 4° C. The quantities of sodium alginate and additives in the gel matrix (sucrose, gibberellic acid, MS nutritional medium), as well as the time of storage, influenced the frequency of shoot and root emergence from encapsulated shoot tips. With shoot tips encapsulated with 2 percent sodium alginate containing 1.5 percent sucrose and 0.5 mg/l gibberellic acid, the frequency of shoot and root induction of non-stored synthetic seeds was highest (GA3). When shoot tips were encapsulated in 3 percent alginate with 1/3 MS medium, sucrose (1.5 percent), and GA3 (0.25 mg/l), they retained their viability and ability to form shoots even after 24 weeks of storage. With storage time, root formation tends to diminish. In the greenhouse,

90% of the plantlets formed from saved and non-stored synthetic seeds survived and developed into phenotypically normal plants. [17]

F. Encapsulation procedure of Giloy

Tinosporacordifolia (Willd.) has been nanoencapsulated utilising poly (D, L-lactide) nanoparticles in this review. Alkaloids with nitrogen heterocycles, such as tropane alkaloids, thiazole, piperidines, and pyridine derivatives; nonisoprene indole alkaloids; and pseudoalkaloids with antidiabetic properties are the principal chemical constituents reported from this shrub. The nanoparticles (NPs) were made utilising a biodegradable poly(D,L-lactide) (PLA) polymer and a solvent evaporation process. Spectroscopic techniques, X-ray diffraction, and scanning electron microscopy were used to analyse the NPs. The NPs' release profile and trapping efficiency are investigated. Furthermore, the synthesised NPs were tested for inhibitory activity in order to determine their antidiabetic potential, and the results were compared using docking analysis. The TC extract was loaded to PLA NPs using the solvent evaporation technique in this investigation. The synthesis of NPs is sonicated at 40 percent amplitude for 30 seconds to get a yield of 48 percent.

The loading efficiency for 5 mg was found to be 76.21 percent, and for 10 mg, it was found to be 58.10 percent. Controlled release was seen up to 8 hours, and 70 percent of the TC was released after 40 hours. The release kinetics were shown to be highly correlated with Higuchi kinetics. The maximal inhibitory percentage of TC-loaded PLA NPs was determined to be 92.59 0.854, indicating that they may have diabetes-related action.

The interactions between the chemicals, fentanyl, and cholic acid, revealed that the greatest binding energies of 6.09 and 6.4 have the ability to activate the insulin receptor. [18]

V. FUNCTIONAL FOODS

Functional foods are foods that have a potentially positive effect on health beyond basic nutrition. Proponents of functional foods say they promote optimal health and help reduce the risk of disease.

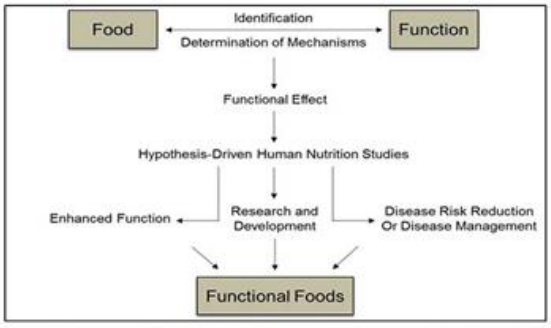

Figure 1. Scientific Basis for Establishing Functional Foods. Gibson GR, Williams CM. Woodhead publishing limited: 2000 Jan 1.

A. OREGANO

The effect of adding oregano to the formulation was examined at 1, 2, 3 and 4 percent in order to generate herbal antioxidant enriched bread of good bakedness, texture, nutrition and sensory properties. A high level of crude fibre (17.43%), total phenol content (87.80 GAÉ/100g DW) and antioxidant activity (84.80%), all of which support their functionality as foods, were found to occur in Oregano. As the oregano levels increased, the baking absorption and specific volume of the bread increased. A 2% oregano level of the bread was chosen as the best from a sensory point of view. The overall phenolic content (TPC) and radical activity of oregano bread were high in both (RSA). The data revealed that oregano can be added to bread at a concentration of up to 2% without substantial changes in bakery, sensory properties and longer shelf lives.

- *EFFECT OF OREGANO ON DOUGH AND BREAD QUALITY*

The oregano has been bought on the local market and dried, ground, put in sterile plastic bags for 1 minute at 915 MHz. The oregano is dried. Bread production was carried on the local market with wheat flour, yeast, salt, sugar, and other ingredients. 100 grammes of flour, compressed yeast, compressed yeast, 2 g of sucrose, shortened bakery, 1.0 g of salt/NaCl, bromated Optimum water, 1 ppm of potassium. Dough was produced with a 45-minute baking schedule, 25 seconds mixing, 20 minutes recovery time, three-minute plate-moulding time, 55 minutes of testing time (86 degrees F, 75 degrees RH) and 25 minutes of baking time (450 degrees F), respectively. The development time for dough increased from 2 minutes to 4 minutes, with the incorporation of 1% oregano, and 4% oregano. The stability of the dough decreased up to a 3% oregano level in the mix. With integration levels increased between 1 and 4 percent, the mixing tolerance index was dramatically reduced from 70 to 45 BU. This showed that oregano was added to the bread and softened the pasta. [19]

B. FENNEL

Fennel is an aromatic plant belonging to the family of Apiaceae and is one of the oldest cultivated medicinal plants in the world. Fennel seeds are economically extremely valuable, as they are used often in the pharmaceutical, food, cosmetic, and healthcare sectors. Fenoline seeds all contain rich dietary fibres, proteins, vitamins, sterols and phenolic materials.

- *EFFECT OF FENNEL (FOENICULUM VULGARE L.) ADDITION ON PROTEIN BREAD QUALITY:*

Seeds of fennel were first mined. Protein bread was then produced using technology. In order to determine the impact of fennel seeds and cakes on protein bread quality and the chemical composition, fennel seeds and fennel cakes were added at 2%, 4% and 6% of the total wheat flour. At minimum speed for five ± 1 min, all ingredients were mixed with a BEAR Varimixe dough mixer. A dough sample was fermented for 25 min at a temperature of 36 ± 2°C. Baked for 20 min at a temperature of 200±5°C and 2 hours cooked at a room temperature of 22±2°C, the samples were baked in a rotating convective oven. Humidity of the control sample

was 44.99 ± 0.23%. Moisture ranges in fennel-fortified specimens were between 50.30 ± 0.09 and 50.85 ±1.15%; in fennel-fortified specimens 48.23 ± 0.92 to 49.11 ± 0.43 percent. [20]

C. LEMON GRASS

Lemon grass is commonly used in Asian cuisine because of its lemon and citrus flavour. Aromatherapy is also used in this plan to decrease stress, pain, etc. and to increase mood. Lemon grass is used as a foundation for a popular tropical drink. It is known as "Takrai" in Thailand because of its widespread use in Thai kitchens. It is often used in the west for seafood curries, marinades and soup; Vietnamese salads have been added. A cup of lemongrass tea reduces fever every four hours.

- *PROCESS OF MAKING TAKRAI*

Ingredients to make takrai: 4 cups water, 2 stalks lemon grass, 2 pandan leaves, sugar or other sweetener, to taste

Process: Cut the pandanic leaves and lemon and then add to the boiling water. Allow to cook until the water has or is scented with a light green colour.

Take tea and sweeter to taste. Serve fully warm or cool and serve on ice cold [21]

D. BASAK

Basak is known for its medicinal properties, especially when it comes to the treatment of bronchitis in indigenous medicine. Basak leaves, bark, root bark, fruits, and flowers can remove intestinal parasites. The plant is all treated with Basak, calves, chronic bronchitis, and asthma. For this, root and bark decoction may be administered for 3 days at doses of 30 grams twice or three times a day. Its fresh leaf juice can also be taken three times a day for a few days in doses of a tea cuchar. In the early stage of bronchitis, Basak provides constant relief, especially when the sputum is thick and adhesive. It liquefies and eases removal of sputum.

- *PROCESS OF MAKING BASAK JUICE*

Swarasa is known as the juice of basak. For dry leaves, the leaves were dried in a 55°C hot air oven, where required, pumped up to 40 mesh, and stored in containers that were airtight. The conventional acid basic extractor method in vasicine was isolated from the A. vasica leaf and followed by column chromatography using silica gel. 100 g fresh sheets were shredded into a fine paste in a stone engine. It was taken and hand-pressed in four layers of muslin to remove juice. One hundred grammes of fresh leaves have been mixed and filtered with 100 ml of water in a blender to remove the juice from the muslin towel in four layers. Finally, the juice was made by a dry leaf powder. [22]

E. SAGE

Sage is an omnipresent spice used in a wide range of dishes. Extracts from two separate sage species (Salvia officinalis and Salvia Lavandula folia) appear to be improved in learning, memory and processing of information by four months for persons with mild to severe Alzheimer's disease. The intake of a single dose of common sage (Salvia officinalis) or Spanish sage (Salvia Lavandula filia) in healthy individuals improves alertness and care. These wise species seem to increase alertness, but not attention or memory if used as an aromatherapy. [23]

- *PROCESS OF MAKING SAGE OIL*

➢ *Ingredients*

2 cups cooking oil, 2 cups lightly packed sage leaves, Large glass jar with tight fitting lid Presentation bottle or oil dispenser, 30 black peppercorns (whole)

➢ *Method:*

Wash and dry the salute leaves before they are put into a tightly fitting large glass jar. Then Toss, slightly crushed, in about 20 pepper-grains. Then Heat the oil. Fill the pot with oil halfway. Ensure it is sufficient to cover the leaf completely. Massage the leaves in the oil with a mixing spoon until completely immersed in them.

Allow the oil to fully cool before the lid is secured. Hold the jar in a cold, dark place for two to three weeks. Test the mixture after two weeks to see whether it is good enough. It is expected to take up to 3 weeks. Shake the jar 3 or 4 times a week during the infusion process. Insert the oil into the final container by using a fine mesh strainer for 10 extra pepper grains after 2 (or 3) weeks.

F. GILOY:

Medicinal plant Ayurvedic Tinosporacordifolia distributes throughout the subcontinents in India and China. The entire plant in the folk Ayurvedic medicine system is used alone and in conjunction with other plants. In research over the past four decades the isolation of various compounds such as alkali, sesquiterpenoids, diterpenoids, phenolics, steroids, the aliphatic and polysaccharides have been intrigued by the wide variety of pharmacological properties, including the commercial value of T. cordifolia. Although pharmacological activities on T. cordifolia extracts and compounds have been studied both in vitro and in vivo, only few methods have been investigated and further development is required. The pharmacological activities of compounds and different T. cordifolia extracts are stressed in this review and the activities of marketed products, and the relevance of phytochemicals and the standardisation of the product on the market for medicinal use are demonstrated. [24]

- *PROCESS OF MAKING GILOY JUICE:*

➢ *Ingredients:*

2 cups of water, 1 tbspDry Giloy Powder, ½ tsp of Turmeric powder, 10-12 pcs of mint leaves, 1 small Cinnamon stick, 1 tsp of Black pepper powder, 1/2 inch of Ginger (grated), 1/2 tbsp of honey.

➢ *Method:*

Pepper and turmeric will be added to a vessel of boiling water. Cook and add giloy powder and rub a minute with rasped ginger and cinnamon. Let it boil and cover for a

minute in low flame. Remove and cool for a while with mint and honey.

VI. ANTIVIRAL ACTIVITIES

A. OREGANO

Oregano has an impressive medicinal quality in the mint family, a well-known herb. The antiviral characteristics of their compounds, including carvacrol.

In a test tube study, both oregano oil and isolated carvacrol have reduced the activity of the murine norovirus (MNV) within 15 min.

Highly infectious MNV is the main cause of stomach influenza in humans. It is very similar to the human norovirus and used by scientists as it is notoriously difficult to grow human norovirus in laboratory environments. Carvacrol and oregano have also been reported to be shown their antiviral activities in an anti-herpes simplex virus (HSV-1) and rotavirus, common causes for diarrhoea in infants or infants and in respiratory syncytial virus (RSV). [25]

B. FENNEL

Fennel is an aromatic spawning plant able to fight some viruses.

A study of the test pipe showed that herpes and parainfluenza-3 viruses (PI-3) had a strong antiviral effect causing cattle's respiratory infections. The major component of essential fennel oil, trans-anethole has demonstrated a strong antivirus effects against herpes virus. Fennel may also boost immune systems and reduce inflammation, which, according to animal research, can also help combat viral infections. [26]

C. LEMON GRASS

The chemistry of an essential oil derived from Egyptian lemongrass and antiviral activity (Cymbopogoncitratus) was investigated. The hydrocarbon and the oxygenated oil were divided into two fractions. The chemical composition of each fraction was investigated using GC and GC-MS. The results showed that the main hydrocarbon and oxygenated fractions were myrcene and citrale (92.8 and 92 percent , respectively, based on fraction weight). Total oil, its fractions and the major elements in each fraction (citral and myrcene) have been tested against the yellow bean mosaic potyvirus (BYMV) antiviral activity, which infects large beans. BYMV, followed by hydrocarbon, lemongrass and citrus, was most anti-functional and the oxygenated part caused least activity. Increased peroxidase activity in the hosts was positively linked to increased concentration of myrcene and resistance to viral infection. [27]

D. BASAK

Adhatodavasica (L) is a shrub commonly known as the Malabar Nut Tree that grows throughout the Indian peninsula. The plant is used in the Indian Indigenous Medicines system and is a well-known sputum in Ayurvedic and Unani medical systems. The leaves are used for the treatment of malaria, chronic fever, inherent bloating, leprosy and toxins. The plant proved abortive, antimicrobial and antimicrobial. The noticeable anti-fat and toxic effects on coastal larvae of the A. vasica leaves of raw extract have been shown. . The plant contains alkaloids like vasicine, vasicinone, deoxyvasicine and vasicol. Vitamin C, saponins, flavonoids, steroids and fatty acids are also components. Bronchodilatory, respiratory and uterine stimulant effects are reported to occur in the vasicine. Antimycobacterial activity was observed in vasicine acetate. A. vasica leaves have also been used as essential oils for ketones, terpens and phenoliques, which have anti-tumor, antioxidant, anti-aging, anti-phenol and sedative effects and contribute to their antimicrobial properties. The vasicine acetylated vasicine derived from A. vasica leaves is present in this communication for the antimicrobial antioxidant and anti-cancer effects. [28]

E. SAGE:

Sage is an aromatic herb which is used for a long time to treat viral infections in traditional medicine. The antiviral properties are mainly attributed to compounds known in the leaves and stems of the plants as safficinolide and sage One. Research in the test tube shows that this herb could fight the Type 1 (HIV-1) human immunodeficiency virus that could lead to AIDS. In one study, the wise extract significantly inhibited HIV activity by preventing the infection by the virus. Field animals like horses, cows and pigs have also become infected with HSV-1 and Indiana vesiculovirus. [29]

F. GILOY:

Menispermaceae family includes tinosporacordifolia. It can be found mainly in Asian provinces like India, Myanmar, Sri Lanka and China. The plant is often used as an important component in many traditional ayurvedic medicines. A common set of common conditions, such as jaundice, rheumatism, urinary disturbances, skin conditions, diabetes, anaemia, inflammation and allergical diseases, is treated by a parent medicine. The plant stem is very useful in treating helminthiasis, cardiovascular conditions, leprosy, rheumatoid arthritis, etc. It also promotes the immune system by increasing the resistance of the body to different infections and supports standard white blood cell structures, functions and levels. Tinosporacordifolia is derived from its various chemical components such as leaf, stem, root, plant, seed, etc. All the above mentioned pharmacological measures. Different classes of chemical components, of alkalis, glycosides, steroids, phenolics, aliphalic compounds, and polysaccharides are present in different parts of the plant, including the root and stem. All of these are well documented in the literature of phytochemistry. The pharmaceutical properties of small molecules in the interaction with the target protein are an important step in drug determination. For small phytoconstituents, several compounds extracted from Tinosporacordifolia had been selected. After proper virtual testing, the drug-like, pharmakokinetic, and lipophile characteristics of these phytoconstituents were evaluated and guidelines for identifying possible drug compounds were established. Following virtual screening via a molecular docking

mechanism we evaluated the potential inhibition properties of CoV-2. [30]

VII. TABLES

ANTIVIRAL EFFECTS FROM HERBS AGAINST SPECIFIC VIRUSES

HERBS	SOURCE	VIRUSES
GILOY (Tinosporacordifolia)	STEM ROOT	SARS COV-2, PROTEASE INHIBITOR FOR HIV , ANTICANCER, ANTIVIRAL INFECTIONS, INFLAMMATION, ANTI DIABETES [31][32]
OREGANO (Oreganumvulgare)	ESSENTIAL OIL	immunodeficiency viruses (HIV and SIV), adenovirus 5 (ADV5), Zika virus, and influenza (H1N1) virus [33]
FENNEL (Foeniculumvulgare)	OIL	Prevent inflammation, anti-cancer, herpes viruses and parainfluenza type-3 (PI-3) [34]
SAGE (Salvia officinalis)	LEAF	Severe acute respiratory syndrome SARS COV-2 [35]
LEMONGRASS (Cymbopogon)	OIL	Human noroviruses (NoV), feline calicivirus (FCV), Tulane virus, porcine sapovirus [36]
BASAK LEAF (Adhatodavasica)	LEAF	INFLUENZA VIRUSES [37]

VIII. CONCLUSION

Medicine from plants or herbs extraction is always a better way to treat diseases with comparatively very less side effects. We did a detailed study on the various antiviral characteristics snd functions of herbs which can be used to treat emerging Or re-emerging infectious diseases permanently. The herbs we studied included giloy, oregano, fennel, sage, lemongrass and basak. The procedure of extraction and encapsulation were studied very minutely so as to obtain the best results both in the functional foods and in the applied medicines. We studied the antiviral activities of the herbs in functional food very importantly keeping in mind the word : "Prevention is better than cure". We studied any and every process of improving food or diet by including the antiviral characteristics of the medicinal herbs in daily life. We have also discussed the effects from each of the herbs and probable improvement scopes in this stream.

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