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A BRIEF REVIEW ON ANTIVIRAL PROPERTIES OF ESSENTIAL OIL

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ABSTRACT

The Volatile odoriferous oil is also known as essential oils, which are aromatic oil liquids obtained from various parts of shrub, plants, herbs and spices. More than 40 plants derivative have been recognized for therapeutically and pharmacological uses.They are mostly used extract for their biological activities are rosemary, lavender, eucalyptus, peppermint and chamomile is utilized since old times in perfumery, food preservation, flavoring, and medicine & used in aromatherapy. Aromatherapy is a pseudoscience which is based on use of aromatic compound or essential oils for curing a person's body, mind and soul. There are various method by which these oils can be administered in various quantity by massage, inhalation or simply apply without rubbing on skin surface and rarely taken internally. The antimicrobial activities of essential oils clearly indicate that they are more acceptable because of their unique antiviral properties. It will be more actively against herpes, HIV, influenza, mumps and hepatitis viruses. As well as it is also beneficial in SARS-COV-2 virus. As essential oils may have many bioactive chemical compounds which can shows synergistic effect on various stages of virus replication, bronchodilation & mucus lysis.

Keywords: Essentials oils, Aroma therapies, Antiviral agents

1. INTRODUCTION

Volatile odoriferous oil also known as essential oils, which are aromatic oil obtained from various parts of plants. It's mainly found in oils sacs and oil glands present at different level in the fruit peel mainly flavedo part and cuticle. It can be obtained by various methods like expression, fragmentation, effleurages, cold pressing, hydro distillation, hydro diffusion solvent extraction, carbon dioxide extraction, microwave assisted process (MAP), steam distillation are widely used for economic production of essential oil. Essential oils may cause minor skin irritation at the site of administration, if administered in large amount essential oils can show photo toxic reaction and can be lethal in rare cases. The therapeutic activity or effects are Antibacterial, antiviral properties. More than 40 plants derivative have been recognized for therapeutically and pharmacological uses they are lavender, eucalyptus, rosemary, chamomile and peppermint are the most often utilized extract. The essentials oils can be categorized on the basis of chemical composition, on the bases of pharmacological & therapeutic activity, on the bases of Aroma (citrus, herbaceous, camphoraceous, floral, woody, earthy, and spicy oils). The most active component of essential oils are terpenoids, phenylpropanoids and other components of essential oils includes oxygenated compounds, phenol, alcohol, monoterpenes alcohol, sesquiterpenes, oxides, aldehyde, esters, lactones, ketones, coumarins, ethers. A US FDA has given the recognize to essential oils for medicinal use. Aroma therapy is derived from word aroma, which means fragrance smell & therapy means treatment. This therapy is an organic way of curing a person's body, mind and soul. It's approved and replacement therapy used in the last 6000 years in countries like India, Egypt, and China **[1]**.

They are widely used in therapeutic, cosmetic, aromatic, fragrance and spiritual uses. There is various method by which these oils can be administered in various quantity by massage, inhalation or simply apply without rubbing on skin surface and rarely taken internally. These oils for treatment of physical and mental balance inhalational, massage on skin and external application of these oils are the very basics of aromatherapy. The aroma therapy oils help individual to relieve stress, regenerate to rejuvenate. Olfactory nerves nose to brain are the site of action of essential oil **[2]**.

There is a trend to use the aromatherapy in the treatment of cancer and sleeping disorder.

In the earlier study locomotors activity of mice is increase by significant inhalation of rosemary essential oil. According to the aroma therapies, the synthetic essential oil doesn't show equal characteristics of the natural oil when been used in the aroma therapy. Many essentials' oils show Synergistic effect on several stages of viral replication and induce positive effect on host respiratory system I.e., bronchodilator and mucuslysis **[3]**.

2. PHARMACOLOGICAL IMPORTANCE OF ESSENTIAL OILS:

2.1 AS ANTIBACTERIAL AGENT :

Essential oil can effective against many pathogenic bacterial strains like *Listeria monocytogenes, salmonella typhimuriuml. Innocua* **[4]**. Such as, thyme & oregano essential oils show bacterial activity against *E. coli, Salmonella choleraesuis & Salmonella typhimurium***.** Gram positive bacteria are more vulnerable to the essential oils. In veterinary therapy cream formulation containing 10% tea tree oil shows quick relief in chronic dermatitis and canine localized acute the chief active ingredient of tea tree oil is terpenen-4-ol **[5]**.

Mouth wash many contain essential oil that can penetrate plug biofilm where they kill pathogenic wall and inhibits their enzymatic activity. Listerine contains thymol, menthol & eucalyptol components which is useful against dental problem. Essential oil containing gargles used in treatment of oropharyngeal candidacies in AIDS. Essential oil can be active against pulmonary tract pathogens. The oil of *Achillea Clavennae* shows maximum activity against *Klebsiella Pneumoniae* and penicillin susceptible and resistant streptococcus pneumonia **[5]**.

2.2 AS ANTIOXIDANT:

Free radicals and other reactive oxygen species cause the oxidation of biomolecules including protein, amino acid, DNA etc. which ultimately lead to ageing cancer. So many essential oils are used to maintain equilibrium between free radicals and antioxidant. The phenolic component containing essential oils like clove, nutmeg, basil, cinnamon, thyme and oregano shows radical scavenging and antioxidant property in the DPPH (2,2-diphenyl-1-pycrylhydrazyl) show radical assay on room temperature. The antioxidant activity not be responsible due to of phenolic group but ketone, aldehyde, hydrocarbons and ether shows free radical scavenging activity of some essential oil like *Thymus caespitius a*nd thymus *camphoratus* shows an antioxidant activity **[3]**.

The tea tree oil act as natural antioxidant against BHT (butylated hydroxy toluene) **[6]**.

2.3 AS ANTI-DIABETIC AGENT:

Antidiabeticactivity of essential oils like rosemary essential oil have hypoglycaemic and insulin releasing effect in diabetic rabbits. The study indicates that lipophilic fraction is not only responsible for this activity but able to enhance sensitivity of insulin in type II diabetes, the studies that were performed were of combination of essential oils like cinnamon, oregano, cumin, and fennel, myrtle etc was administered orally **[7]** .

The fasting blood sugar level in diabetic rat is measurably decrease by the essential oil of *Satureja khuzestanica*. Combination of tulsi and eugenol reduce raised blood glucose, triglyceride, cholesterol level, in blood serum indicate good anti diabetic activity **[8]**.

2.4 IN CHEMOPREVENTION AND CANCER SUPPRESSION:

The variety of alimentary monoterpenes exhibit antitumor activity as well as prevent progression of cancer **[9-10]**. During the loading phase protection against chemical damage can be induced by phase 1 and phase 2 drug metabolizing enzyme. Essential oils and their active constituents such as carvacrol,perillyl alcohol (POH), α humulene, β caryophyllene, d-limonene, geraniols, myrcene thymol, and citral possess cytotoxic effect on tumor cell.[11] Different Mechanism of actions are involved in cancer treatment are activation of detoxification enzyme, modulation of DNA repair signaling, antimetastatic or antiangiogenics **[12-13]**.

2.5 RECTAL SUPPOSITRIES AGAINST VAGINAL INFECTION:

Many essential oils are used in the form of suppositories, douche, tampon which are directly absorbed in the surrounding tissues used for the vaginal infection like *candida albican*s. Essential oil used in treatment of gynecological, urinary tract infection and hemorrhoids in double blind therapy. Sandalwood oil is used in urinary condition through vaginal route. Lavender oil is effective in treatment of vaginal discharge. Oregano oil is utilized to suppress the growth of *candida albicans* **[14]**.

2.6 AS ANTIVIRAL AGENTS:

Essential oils possess high level of antiviral action against several RNA & DNA viruses like herpes simplex virus type-1 and -2 (HSV-1 and HSV-2), poliovirus, influenza virus adeno type 3, dengue virus type-2, coxsackievirus B-1 and Junín virus. The oregano oil and clove oil has been describes as remarkable antiviral property against a various species of non-enveloped DNA and RNA viruses including coxsackie virus B-1 adeno virus type-3and polio virus. Oil of tea,

eucalyptus and thyme & monoterpenes have shown active against HSV-1 **[15-17]**.

Incorporation of essential oil *Artimisiaar boreseen s*in multilamellar liposomes shows enhancement in activity against intracellular1 HSV and Replication of HSV-2 is also supressed by *Melissa officinalis L.* essential oil due to the presence of citric and citronellal the replication of HSV-1 can be hindered by administration of various essential oils *in vitro*. Lemon grass essential oil possesses the HSV1 activity and inhibits replication, Peppermint (*Mentha Piperita)* essential oil show high level of veridical activity against herpes 1 and herpes 2 virus, Acyclovir-resistant strain of herpes1 virus in viral suspension tests **[18]**. Eucalyptus oil possess viricidal activity against HSV-1, 2 (*Santolina insularis*) showed an anti-viral activity against HSV-1 and HSV-2 in vitro and prevent cell-to-cell virus spread. The below table includes the different essential oils showing activity against different viruses.

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Table 1: Table showing different essential oil have antiviral properties

PLANT NAME	BIOLOGICAL SOURCES	CHIEF CONSTITUENTS	USES
Anise(apiacaeae) [15]	*Pimpinella anisum*	Trans – anethole, γ-himachalene, E-methyl eugenol,α-cuparene, p-anisaldehyde.	Inhibits HSV infectivity
Basil (lamiaeace) [15]	*Ocimumbasilicum*	Linalool, methychavicol	Active against herpes virus, hepatitis B, enterovirus
Cinnamon(lauraceae) [15]	*Cinnamomum zeylanicumnees*	Cinnamaldehyde, procyanidins, catechins cinnamate, cinnamic acid,.	Influenza A virus, parainfluenza (sendai) virus, HSV 1 virus
Clove (myrtaceae) [16]	*Syzgiumaromaticum*	Eugenol, eugenyl acetate and caryophyllene.α-humulene	Activity against HSV1 & HSV2 virus
Coriander (apiaceae) [16]	*Coriandrum sativum*	D (+) linalool (Coriandrol 60-70%). Also includes borneol, p-cymene, limonene alpha-pinene, camphor and geraniol.	*against* herpes *virus* infections Aromatic, carminative, stimulant,
Eucalyptus (myrtaceae) [16]	*Eucalyptus globulus*	1, 8-cineol (49.07 to 83.59%) and α-pinene (1.27 to 26.35%)	mumps viruses (MV) and herpes simplex viruses (HSV-1 and HSV-2)antibacterial, antifungal,
Garlic(Amaryllidaceae) [16]	*Allium sativum*	diallyl thiosulfonate (allicin), diallyl sulfide (DAS, E/Z-ajoene, S-allyl-cysteine (SAC)),	HSV1, HSV2, parainfluenza virus type 3, vaccinia virus, vesicular stomatitis virus, and

		diallyl disulfide (DADS), diallyl trisulfide (DATS)	**human rhinovirus type 2.bronchitis, hypertension ,TB ,liver disorders, dysentery, flatulence, colic**
Jasmine (Oleaceae) [16]	***Jasminuisambac***	**Jasmone, benzyl acetate, methyl anthranilate, methyl jamonate**	**antimicrobial, insecticidal, antioxidant, anti-fertility and dermatological effect**
Lavender (lamiaceae) [17]	***Lavandula angustifolia***	**Linalool, linalyl acetate, 1, 8-cineole B-ocimene, terpinen-4-ol, and camphor.**	***against avian influenza (H5N1) virus, Herpes simplex virus, hepatitis B virus***
Lemon (rutaceae) [17]	***Citrus limon***	**Citric acid, hesperidin, diosmin, eriocitrin, and d-limonene.**	**Hepatitis A virus , prevention of sexually transmitted human immunodeficiency *virus* type 1 (HIV-1) ,cold and flu, H1N1 (swine) flu, ringing in the ears (tinnitus), Meniere's disease**
Lemon grass(poapceae) [17]	***Cymbopogon flexuosesstapf.***	**Myrcene, limonene, citral, geraniol, , neral, and nerol, citronellol, geranyl acetate.**	**Antifungal activityagainst yeasts, molds, and dermatophytes antiviral activityagainst HSV-1. yellow fever virus**
Marjoram(lamiaceae) [17]	***Origanum Majorana L.***	**Hesperetin, catechin, quercetin, kaempferol, naringenine**	**Influenza A/WS/33 virus. used for coughs, gall bladder complaints, , depression, stomach cramps and digestive disorders**
Oregano(lamiaceae) [17]	***Origanum valgare***	**consist of phenolic compounds (primarily *carvacrol* and *thymol*). This *oil* also contains β fenchyl sesquiterpene, γ *terpinene*, terpineol alcohol, flavonoids**	**Antiviral, anti-inflammatory, and antioxidant properties. I**
Peppermint(lamiaceae) [18]	***Mentha longifolia***	**Major constituent carvacrol, β fenchyl alcohol, thymol, and γ terpinene.**	**activity against HSV-1 and HSV-2**
Rose (Rosaceae) [18]	***Rosa kordessi***	**citronellol, geraniol, nerol, linalool, phenyl ethyl alcohol, farnesol, stearoptene, α-pinene, β-pinene, α-terpinene, limonene, p-cymene, camphene**	***Herpes Simplex* Virus-1 *and* -2**
Rosemary(lamiaceae) [18]	***Salvia rosmarinus***	**P-cymene (44.02%), linalool (20.5%), gamma-terpinene (16.62%), thymol (1.81%), beta-pinene (3.61%), alpha-pinene (2.83%) and eucalyptol (2.64%).**	**Antiviral activity against herpes viruses, HIV, influenza, immunomodulator and hepatitis,rich source of antioxidants and anti-inflammatory compounds, increases blood circulation**
Sandalwood (santalaceae) [18]	***Santalum album***	**More than 90% sesquiterpenic alcohols of which 50–60% is the tricyclic α-santalol. β-Santalol**	**Activity against Herpes simplex viruses-1 and -2. Other problems common cold. Urinary tract infections. Liver and gallbladder problems.**
Tea tree(myrtaceae) [18]	***Melaleuca alternifolia***	**1, 8-cineole, terpinen-4-ol, alpha-terpineol, and gamma-terpinen.**	**Common bacteria and virus including E. coli, S. pneumonia antiviral *activity against* herpes simplex *virus* type 1 (HSV-1) in vitro.**
Thyme (lamiaceae) [19]	***Thymus vulgaris***	**Major *components* were p-cymene (8.41%),%) linalool**	**Effective against resistant strains of *Staphylococcus,***

		(1.8-60.4%), geraniol (0.1-50.5%), γ-terpinene (30.90, and thymol (1.6-58.4%)	***Enterococcus, Escherichia and Pseudomonas* bacteria. Antiviral *activity against* HSV-1 in vitro.**
Vetiver (poaceae) [19]	***Chrysopogonzizanioides***	**B - vetispirene, vatiselinenon, α –vetivone**	**Applying on skin for relieving stress, emotional trauma & shock, lice & repelling insects.**

3. CONCLUSION

The biochemical properties of plant have obtained interesting results in agricultural, clinical, and pharmaceutical fields. The uses of essentials oils in pharmaceutical, chemical and agrochemical industries as natural derivatives for synthetic microbicide drugs (i.e. kills the growth of micro-organism) is a field of innovating interest, it can be concluded that essential oils have the potential to be developedas preventive or therapeutic agents for various viral diseases such as herpes, HIV, influenza virus other gram positive and gram negative bacteria

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