

Antiviral Effects of Essential Oils

by Hope E. DeVall

Level One – Clinical Aromatherapy

The Mind Body Connection, LLC

131 McDowell St, Suite 302 Asheville, NC 28801

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A virus is a microorganism that survives on the living cells of other organisms defying the definition of life. If a virus is unattached to a host it is considered inert. As soon as it comes in contact with a viable host, it infects the cells of that living being, and comes to life. Viruses are by far the most abundant “biological entity” on the planet and they do not show prejudice when choosing their hosts (Medical News Today). They inhabit and infect humans, animals, plants, bacteria and fungi. Some of the most common and most deadly illnesses are viral infections. For example, both the common cold (Rhinovirus) and the flu (Influenza) are viral infections as are the Ebola Virus and the Human Immunodeficiency Virus (HIV). According to the CDC, in 2013 there were 56, 979 deaths attributed to the influenza virus making it the eighth leading causes of deaths in the United States. Viral infections are much more difficult to treat than bacterial infections. Antibiotic drugs have no effect on a virus, and are commonly over prescribed for treating viral illnesses. Not only will this unnecessary use of prescription medication be ineffective, but it also has the potential to cause harm by causing unnecessary side-effects and contributing to anti-biotic resistance (WebMD).

An antiviral drug or herb is used to treat viral infections. Unlike antibiotic remedies, which kill the targeted bacteria, antiviral remedies inhibit the development of the virus and interfere with its ability to bind with a host. This helps to control the spread of the infection, but it does not eliminate the viral infection. Substances with antiviral properties should be distinguished from virucides, which actually deactivate or destroy a virus. Finding virucides, which are able to destroy a virus without destroying its host cell, is a challenge. We can however use the natural chemical properties of many essential oils to boost immunity against specific viruses and prevent them from developing further.

There are several essential oils that are documented as having antiviral properties. Among them, the most studied are *Ocimum basilicum* (Basil), *Cinnamomum verum* (Cinnamon), *Syzygium aromaticum* (Clove), *Eucalyptus radiata* (Eucalyptus), *Hyssopus officinalis* (Hyssop), *Helichrysum italicum* (Helichrysum), *Lavandula angustifolia* (Lavender), *Laurus nobilis* (Bay Laurel), *Rosmarinus officinalis* (Rosemary), *Citrus limon* (Lemon), *Melissa officinalis* (Lemon Balm), *Myrtus communis* (Myrtle), *Melaleuca alternifolia* (Tea Tree), *Melaleuca quinquenervia* (Niaouli), *Origanum vulgare* (Oregano), *Mentha piperita* (Peppermint), *Ravensara aromatica* (Ravensara), and *Thymus vulgaris* var. *linalol* (Thyme) are all considered to have a high content in chemical constituents with antiviral properties (CaraHealth). In a similar way to antibiotics, different antiviral substances react with specific viruses. This is due to the particular qualities of the individual chemical constituents present in each oil. The effect of essential oils on the virus also depends on its structure.

There are two classifications of viruses; enveloped or non-enveloped, which describes a protective layer of protein that surrounds the virus. Enveloped viruses are typically more sensitive to essential oils with a high content of monoterpene alcohols, such as linalool, citronellol, geraniol, alpha-terpinol, terpinol-4-ol, menthol, carvacrol and thymol. Non-enveloped viruses are more susceptible to essential oils with a high content of ketones. For example, pinocamphone, verbenone, and pinocaryone, which are more prevalent in broad spectrum antiviral essential oils (Cara Health). Table 1.1 shows antiviral chemical constituents, and the essential oils with the highest content of those chemicals.

In trying to understand the antiviral effects of these essential oils on different viruses and their hosts, a tremendous amount of research is being done to explore the potential to treat some of the most noxious and far too common pathogens including the Rhinovirus, Influenza, Herpes Simplex Virus and the Human Papilloma Virus.

Rhinovirus

The common cold is a group of symptoms affecting the upper respiratory tract caused by one of many potential viruses, most commonly the Rhinovirus (responsible for between 10-40% of colds). Also, the Coronavirus cause about 20% and the Respiratory Syncytial Virus (RSV) causes 10% of colds (Webmd). There is still no known cure for the common cold (Science Daily), and unfortunately it seems this extends to herbal remedies and essential oils as well. Many essential oils are reactive to the Rhinovirus in-vitro, but few studies have been able to show promise once the virus has met its host. In this instance the best use of essential oils are in prevention and immune strengthening. Essential oils such as Citrus limon (Lemon), *Lavandula angustifolia* (Lavender), *Eucalyptus radiata* (Eucalyptus), or *Melaleuca alternifolia* (Tea Tree) have been shown to be anti-microbial, destroying many types of pathogens on the surfaces of desks, telephones, or other shared personal items. Application of *Eucalyptus radiata* (Eucalyptus), *Rosmarinus officinalis* (Rosemary) and *Cinnamomum verum* (Cinnamon) essential oil in water with vegetable glycerin, and vitamin E (for the skin) at a 3% dilution ratio makes a natural and fragrant hand sanitizer. A few sprays on the hands is also effective at preventing the spread of the cold virus.

Precautions: It is important to note that *Eucalyptus radiata* (Eucalyptus) and *Rosmarinus officinalis* (Rosemary) are contraindicated for those with epilepsy, high blood pressure, during pregnancy and young children less than five years of age. Citrus essential oils all have the potential to irritate the skin, are photosensitive and should not be used in the bath.

Essential oils can be used to strengthen one's immunity. For example, *Laurus nobilis* (Bay Laurel), *Cinnamomum verum* (Cinnamon leaf), *Eucalyptus radiata* (Eucalyptus), *Boswellia carterii* (Frankincense), *Origanum vulgare* (Oregano), *Lavandula angustifolia* (Lavender),

Rosmarinus officinalis (Rosemary), *Melaleuca alternifolia* (Tea Tree), and *Thymus vulgaris var. linalol* (Thymus) all have been documented to boost the function of the immune system.

Diffusing these essential oils and others in the air boosts immunity also helps to combat airborne pathogens. Using a glass nebulizing diffuser is best. Avoid plastic devices or those that involve heat, as heating these oils can change their chemical composition. Nebulizing diffusers emit pure essential oil into the air rather than vaporizers, which mostly emit water.

Influenza

As discussed earlier, the Influenza virus is one of the most common yet most deadly viral infections in the world. Essential oils can make an excellent preventative measure and early defense. It is important to note that essential oil treatments (like antiviral drugs) are most effective if started early in the stage of infection. Eucalyptus radiata (Eucalyptus) and Ravensara aromatic (Ravensara) have been documented as effective against influenza due to the high content of the chemical constituent alpha-terpinol, as well as *Melaleuca alternifolia* (Tea Tree) oil, due to its constituents terpinene-4 and alpha terpinene. A clinical study reported in a microbiology journal in 2009 the effects of *Melaleuca alternifolia* (Tea Tree) oil on a number of viruses including the influenza virus in-vitro and was shown to have antiviral effect on the it as well as H1N1, and could be a promising treatment for the influenza virus in certain applications (Garazzo 806). Also, in 2010, the department of Respiratory Medicine, the First Affiliated Hospital of Soochow University, in China conducted a study using a blend of essential oils including *Citrus sinensis* (Orange), *Syzygium aromaticum* (Clove), *Cinnamomum verum* (Cinnamon), *Eucalyptus radiata* (Eucalyptus) and *Rosmarinus officinalis* (Rosemary) and evaluated the blend's ability to influence

the influenza virus in infected canine kidney cells. The treatment at a 1:4 dilution ratio was effective and weakened the influenza virus without affecting the cells. *Eucalyptus radiata* also shows to be helpful in the early stages of a viral upper respiratory infection a common result of influenza (Martin 25).

Treating Cold and Flu Symptoms

In addition to having an antiviral, antimicrobial, and immune-stimulant effect, essential oils can also help to alleviate the symptoms of both the Cold and Flu Virus. *Rosemarinus officinalis* (Rosemary), *Eucalyptus radiata* (Eucalyptus), *Lavender angustifolia* (Lavender), *Myrtus communis* (Myrtle), *Mentha piperita* (Peppermint), *Ravensara aromatic* (Ravensara), and *Melaleuca alternifolia* (Tea Tree) oil have all been documented in studies to help alleviate symptoms of both viruses including sneezing, runny/stuffy nose, cough, congestion, and sinus headaches due to their expectorant and decongestant properties. *Eucalyptus globulus* is an ingredient in many over the counter cough syrups, cough drops and is most notably the primary active ingredient in Vicks Vapor Rub. Its anti-viral and decongestant effect is partly due to the natural chemical constituent Cineol or Eucaluptol (also found in *Rosemarinus officinalis*). In fact, in a double-blind, placebo controlled study of 152 people who used *Eucalyptus* (both species *Eucalyptus globulus* and *radiata*) high in 1, 8-Cineole topically, three times per day showed a vast improvement in symptoms compared to the placebo group (Schnaubelt, 36).

When treating symptoms of the cold or flu with essential oils, they are often applied to the chest as a salve (based in coconut/olive oil and beeswax), in a bath with salts, as hot or cold compresses, diffused in a room or steam inhaled. Based on the course material from *Aroma Apothecary, Clinical Aromatherapy, Level 1*, it is important to mention that many of the antiviral essential oils are not indicated for use in the bath. In light of that I would recommend a blend of

Melaleuca alternifolia (Tea Tree), Lavandula angustifolia (Lavender) and Boswellia carteri (Frankincense) mixed in Epsom Salt to help alleviate any body aches associated with the illness and to weaken the virus. In conjunction, I would recommend a salve of Eucalyptus radiata and Mentha piperita (Peppermint) rubbed on the chest and the diffusion of Melaleuca alternifolia (Tea Tree), Citrus limon (lemon) or Cinnamomum verum (Cinnamon leaf). It is important to note that Mentha piperita (peppermint) is contraindicated for use near the face, and rosemary and eucalyptus are contraindicated with high blood pressure, epilepsy or on children less than five years of age.

Herpes Simplex Virus

Herpes Simplex Virus (HSV) is a common viral infection which most often manifests in two ways, oral herpes (HSV-1) or genital herpes (HSV-2). HSV-1 which typically forms around the mouth are often referred to as cold sores. HSV-2 manifests sores on the genitals and is considered a sexually transmitted disease. It is estimated that one in four women and one in five men have contracted and carry the virus (WebMD).

One of the most widely studied and documented uses of antiviral essential oils is the use of Melissa officinalis (Lemon Balm) in treatment of the Herpes Simplex Virus (HSV). Its ability to affect the virus is due to the high content of the chemical constituent citral. While Melissa officinalis (Lemon Balm) is not considered a broad-spectrum antiviral, it has been documented in a number of clinical studies to be an effective topical treatment for HSV1/HSV2, Shingles/Chickenpox (Herpes Zoster), and mononucleosis caused by the Epstein –Barr Virus (Koch 2008). Melissa officinalis (Lemon Balm) has performed well in a number of clinical trials

in treating HSV1 and HSV2 through topical application. In one study, *Melissa officinalis* (Lemon Balm) applied topically as a balm 4-times per day was equally effective as the leading medication Acyclovir (Lai 2012).

In another double-blind placebo study, they followed 66 people who were just beginning to develop the symptoms of HSV1 which was promptly treated with topical application of a *Melissa officinalis* (Lemon Balm) cream which produced documented significant benefits by day two of the study. A reduction of the discomfort, number and size of the blisters was documented (Schnizier 2008).

Another double-blind placebo trial followed 116 participants with HSV2, who used a cream of *Melissa officinalis* (Lemon Balm) or a placebo cream for up to 10 days. The results showed a significantly higher rate of recovery in the *Melissa officinalis* (Lemon Balm) group than those receiving the placebo treatment (Wolbling 1994).

As mentioned in the studies, it seems a topical application is best. Creating a salve or a balm with anti-inflammatory carrier oils such as Shea Butter, Coconut oil, Calendula Oil, and St. John's Wart oil mixed with either a high concentration of *Melissa officinalis* (Lemon Balm) essential oil, or a combination of *Melaleuca alternifolia* (Tea Tree), *Melissa officinalis* (Lemon Balm) and *Helichrysum italicum* (*Helichrysum*). According to research, the topical application worked best when applying three times per day. This is a relatively safe blend, however, *Melissa officinalis* (Lemon Balm) may cause irritation with sensitive skin (if not diluted properly (Martin 102).

Human Papilloma Virus

Human Papilloma Virus (HPV) has more than 100 related viruses which live in the body's epithelial cells found on the skin's surface and other sensitive areas. The term "papilloma" refers

to a kind of wart that results from some HPV types. HPV forms over 100 types of warts on the body, many on the hands and feet and others which are sexually transmitted that form on or around the genitals. Warts are usually a small circular skin growth about the consistency of a scab. The virus is contagious, and can be passed by contact with another person. The most common warts that manifest as part of the HPV are Common warts, Plantar warts (on the surface of the foot), Flat warts, Filiform (around the mouth, nose or chin), Perilungual (found on the fingernails or toenails), Molluscum (pimple-like, found on the trunk, arms or legs), or genital warts (a highly contagious STD) (WebMD).

Essential oils have been common protocol in folk remedies associated with warts throughout history. *Abies balsamea* (Balsam Fir) and *Callitris columellaris* (Blue Cypress) being at the top of the list (Martin 56). Through clinical trials, we have learned that other essential oils are even more effective, such as *Melaleuca alternifolia* (Tea Tree) or *Origanum vulgare* (Oregano) for plantar warts, and *Santalum album* (Sandalwood) for other more sensitive strains of HPV. According to research, it seems that for warts neat application to the affected area is best (VIROXIX 2011). It is important to note that *Origanum vulgare* (Oregano) oil can be a possible skin irritant for those with sensitive skin, and is not indicated for use in the bath. Both *Origanum vulgare* (Oregano) and *Callitris columellaris* (Cypress) are contraindicated in pregnancy.

Broad Spectrum Antiviral Essential Oils

There are a few essential oils that are considered broad-spectrum antivirals, which means that it is effective on a large number of different microbes. It's important to note that just because they have the greatest ability to destroy virus in vitro (in a petri dish) does not necessarily mean that it will have that effect in the human body, once a virus infects its host or what effect that essential oil will have on the host. Some essential oils that have the highest anti-viral properties

are also contraindicated for use in humans. For example *Illicium verum* (Star Anise), which has shown to be an extremely powerful antiviral, is not recommended for therapeutic use. *Hyssopus officinalis* (Hyssop) is considered the most broad-spectrum antiviral essential oil, while it is sometimes used in therapy, it is recommended to use with caution as it is not safe for those who have epilepsy due to a neurotoxic effect. It is also contraindicated in pregnancy and with children (Martin 88). *Cinnamomum verum* (Cinnamon) essential oil is a safer example however it is highly skin sensitizing, so topical application is tricky. It is also contraindicated during pregnancy. It is recommended to combine *Cinnamomum verum* (cinnamon) with a citrus oil containing limonene in a 1-2% dilution in order to lessen the skin irritation. Also *Cinnamomum verum* (cinnamon) can be diffused in a nebulizing diffuser in small amounts. In large amounts it may become irritating to the eyes, nose and throat (Martin 64). *Origanum vulgare* (Oregano) is one of the safest and strongest broad-spectrum antiviral oils, however it works best to destroy virus before they enter the body.

Conclusion

In conclusion essential oils have shown to be a powerful tool in treating prevention and treatment of viral infections, specifically in the case of the Herpes Simplex Virus, Viral respiratory Infections and Influenza. In addition to antiviral properties, essential oils have many healing properties for alleviating symptoms of viral infections, and boosting our immunity. Because of the complexity and diversity of the various types of viruses, more research needs to be done to determine their potential for naturally combating some of our most rampant and dangerous health conditions.

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Tables

Table 1.1

Chemical Constituents	Chemical Group	Essential Oils high in content
Linalool	Monoterpene Alcohol	Coriander, Lavender, Bay Laurel, Palmarosa, Sweet Basil, Sweet Orange, Petigrain and Thyme
Citronellol	Monoterpene Alcohol	Geranium, Rose Otto
Geraniol	Monoterpene Alcohol	Rose, Palmarosa, Citronella
Alpha-terpinol	Monoterpene Alcohol	Eucalyptus Radiata, Ravensara, Niaouli
Terpinol-4	Monoterpene Alcohol	Tea Tree, Hyssop, Marjoram
Menthol	Monoterpene Alcohol	Peppermint, Spearmint
Carvacrol	Phenol	Oregano, Thyme, Bergamot, Marjoram
Thymol	Phenol	Oregano, Thyme
Pinocamphone	Ketone	Hyssop
Verbenone	Ketone	Rosemary
Caryophyllene	Sesquiterpene	Lavender, Rosemary, Thyme
Cinnamic aldehyde	Phenol	Cinnamon
Citral	Monoterpene Alcohol	Melissa, Lemon Myrtle, Lemongrass, Lemon, Orange
Eugenol	Phenol	Clove, Cinnamon, Basil, Bay Laurel
Gamma- Terpinene	Monoterpene	Juniper, Eucalyptus, Niaouli, Tea Tree
Linalyl acetate	Ester	Lavender, Bergamot, Clary Sage

1,8 Cineole	Oxide	Eucalyptus, Bay Laurel, Lavender (Latifolia), Peppermint, Rosemary
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Table 1.2: Therapeutic Blend for topical application

Condition	Top Notes	Middle Notes	Base Notes
Common Cold/ Viral Upper Respiratory Infection	Eucalyptus Bay Laurel Lemon Oregano Tea Tree Thyme	Lavender Marjoram Peppermint Ravensara Rosemary	Cinnamon Frankincense Helichrysum
Influenza	Coriander Eucalyptus Bay Laurel Lemon Myrtle Oregano Tea Tree Thyme	Hyssop Melissa Ravensara Rosemary	Cinnamon Clove Frankincense Helichrysum
Herpes Simplex	Basil Tea Tree Thyme	Melissa	Clove
Human Papilloma Virus	Lemon Tea Tree Oregano Thyme	Cypress Fir Blue Cypress	Cinnamon Clove Sandalwood