

Pharmacological Aspects of Essential Oil - Wintergreen Oil

R. S. Rakhi Menon

Abstract: Wintergreen oil an essential oil has been used since years as antiseptic, antipyretic, anti rheumatic, aromatic and astringent properties. In India, it has been traditionally been used to relieve pain and fever and topically for muscle pain. Ancient Indian medicine has touted *Gaultheria procumbense* as an herb with the ability to provide hepatic regeneration, platelet aggregation inhibitor. Since wintergreen oil has antimicrobial, antioxidant, astringent, and other useful properties, it is quite widely used. The objective of this article is to highlight various uses of wintergreen essential oil.

Keywords: Essential Oils, Wintergreen Oil

1. Introduction

Essential oils (also called volatile oils) are aromatic oily liquids obtained from plant materials (flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and roots). They can be obtained by steam distillation method which is the most commonly used technique for commercial production. Some oils have been used in cancer treatment. (14).The antimicrobial activity of plant oils and extracts has been recognized for many years. Plant oils and extracts have been used for a wide variety of purposes since many years. In particular, the antimicrobial activity of plant oils and extracts has formed the basis of many applications, including raw and processed food preservation, pharmaceuticals, alternative medicine and natural therapies(15).A wide variety of essential oils possess antimicrobial properties. In many cases this activity is due to the presence of active monoterpene constituents. Studies show that monoterpenes exert membrane-damaging effects(16).About 100% pure components of essential oils have been tested for their antioxidant effect. The main compounds, namely monoterpene hydrocarbons, oxygenated monoterpenes, sesquiterpene hydrocarbons, oxygenated sesquiterpenes, benzene derivatives, and non isoprenoid components comprising alcohols, aldehydes, ketones, are the most common constituents of most essential oils.(17)

Genus name - *Gultheria*

Species name - *Gultheria procumbense*

2. Other Common Names

- wintergreen
- Winterberry
- Checkerberry
- Tea Leaf
- Deer berry
- Box berry
- Eastern teaberry

a) Botanical Description

This plant is an herb belonging to the family Ericaceae, (2) native to North America, Europe and Nepal (3). This is a low-growing plant, found in forest having a pleasant aroma and taste. It is a small low-growing shrub, typically reaching 10–15 centimeters. Their leaves are evergreen, elliptic or

ovate 2–5 cm long and 1–2 cm broad, with a distinct oil of wintergreen scent. The flowers are bell-shaped, 5 mm long, white, borne solitary or in short racemes. The berry-like fruit is actually a dry capsule surrounded by fleshy calyx (6).leaf part of the plant has the medicinal value. (4)

b) Chemistry

Wintergreen oil is an extracted product of a small herb called the checkerberry or teaberry. The main constituent of wintergreen oil is Methyl Salicylate. This makes up to 98% of its content. This component gives to strong aromatic sweet woody odor to its oil which is pale yellow or pinkish fluid. It may also contain tannin and resin, α -pinene, myrcene, delta 3 carene, 3, 7-guaiadiene, delta cadinene which gives the plant a distinct medicinal smell. (5) (1) this oil is widely being used as antiseptic ingredient, cream and ointments for joint and muscular skeletal disorder. (1)

c) Oil Extraction

A volatile oil is obtained by first macerating the leaves in warm water. The oil is then extracted by steam distillation of leaves. Chemical composition is almost 100% pure *methyl salicylate*, but trace amounts of other chemicals may also be found.

d) Actions & Uses:

- Wintergreen oil acts in a similar way as aspirin in that it can produce analgesic effect when topically applied on skin.
- It also shows antipyretic actions when the essence of wintergreen is mixed with alcohol
- Is very effectual against intermittent fever.
- This can also be used to treat sexually transmitted disease as gonorrhea and in gonorrheal & other rheumatism.
- Wintergreen oil can be used for trigeminal neuralgia, and in subcutaneous and chronic cystitis.
- This oil is used as liniments and ointments for relieving pains in above mentioned cases.
- This is also used in many food and beverages, candies and also in tooth paste(7).
- In perfumery they are used in forest type of woody perfumes. (8)

3. Properties

- antiseptic
- astringent
- antipyretic
- anti-inflammatory
- analgesic
- antispasmodic
- hepatic regeneration
- platelet aggregation inhibitor (11)

They are traditionally used for muscular rheumatism, tendinitis, cramps, myositis, hypertension, nephritic colitis. When wintergreen oil is applied topically with a carrier, the oil has anti-inflammatory activity on muscles (11). Very limited research indicates their antifungal activity (12).

Antimicrobial Activity

Nikolic et al conducted a study on the antimicrobial activity of *G. procumbens*. In this study, minimum inhibitory concentration, minimum bactericidal/fungicidal concentration were determined by micro dilution method in 96 well micro titer plates. The result of this study showed variable degree of antimicrobial activity on various tested organisms. *G. procumbense* had its highest antimicrobial activity on *P. aeruginosa* with MIC of 0.63mg/ml and MBC of 1.25mg/ml. The most resistant organism was *S. aureus* with MIC 3.0mg/ml and MBC from 0.39 to 4.16mg/ml. *G. procumbense*'s effect on microorganisms belonging to food groups was found to be effective on almost all bacteria. In general gram positive bacteria were more resistant than gram negative bacteria.

Hammer et al. 1999 examined antimicrobial activity of different essential oils, including *G. procumbens* oil, and plant extracts against bacteria and fungi using agar dilution method. They resulted that this oil had good antibacterial activity against *E. coli*, *S. typhimurium* and *Serratia amercenscens* at 0.50mg/ml and against *C. albicans*, *Aeromonas baumannii* at 0.25mg/ml. The more resistant were *P. aeruginosa* and *S. aureus* with inhibiting concentration of 2.00mg/ml (10). This oil was first susceptible for *S. mutans* which is a cariogenic in nature. This bacteria colonizes on the tooth structure and produces polysaccharides. (9) Reports have shown that *G. procumbense* has antimicrobial, antioxidant, anti-inflammatory activities. (9)

Anti Candidial Activity:

G. procumbense oil inhibits growth of *Candida* sp. With MIC of 1.25-5.00mg/ml and MFC of 5.0-10.0mg/ml. This oil showed anti-fungal property against micomycetes and the most resistant strain was *A. Flavus*. The most sensitive fungi were *A. fumigates*, *A. Niger* and *P. Funiculosum*. (9)

Dental Gum Pain:

Tooth ache and gum pain are generally related as they occur in oral cavity. Wintergreen oil acts well against this pain. (18) As mentioned above, wintergreen oil has analgesic effect, it helps reducing pain. So in case of gum pain, wintergreen oil can be applied topically. Though this oil is a natural pain killer, usage of this oil very frequently in large amount may be harmful. This is not a permanent remedy as

gum pain is not a normal condition and can reoccur. Hence a trip to dentist is indicated. (19)

Anesthetic Property:

Russell Danner et al conducted a study where spearmint (l-carvone) oil and wintergreen (methyl salicylate) oil emulsion (CMSE) was used to anesthetize fishes. His study evaluated the effect of CMSE on age 1 landlocked Atlantic salmon *Salmo salar* sebago (hereafter salmon). Salmon were immersed in either 257 ml/L CMSE or 75 mg/L tricaine methanesulfonate (MS-222) to induce anesthesia (stage 4). Then salmon were recovered in fresh water. Induction was quicker in the CMSE group; however, recovery was quicker in the MS-222 group. The result showed that salmon displayed protective behaviors, such as flaring opercula, coughing, and anxious swimming and splashing, when immersed in the CMSE anesthetic bath. In this study, CMSE was found to be an effective immersion fish anesthetic. Salmon were rapidly anesthetized with CMSE to stage 4 anesthesia for routine husbandry procedures and were anesthetized to stage 5 anesthesia for an invasive procedure. All procedures were accomplished at concentrations of l-carvone and methyl salicylate that are similar to concentrations of spearmint oil and wintergreen oil found in human food, candy, chewing gum, tobacco products, toothpaste, mouthwash, cosmetic products, and approved pharmaceuticals. Because all of the ingredients in CMSE are already present in approved pharmaceuticals and the human food chain, CMSE may provide a solution to overcome the longstanding challenge of finding a 0-d preslaughter withdrawal anesthetic for food fish in the United States. (20)

Adverse Effect

Wintergreen oil is highly toxic and should be applied externally only. High doses of topically applied wintergreen oil can be toxic, as salicylates can be absorbed Trans dermally. It should not be used among people with chronic kidney or liver conditions. Wintergreen oil also has blood-thinning effects similar to aspirin. People who take blood thinners such as warfarin, or those who are sensitive to aspirin are advised against taking wintergreen essential oil (13).

This oil is unsafe orally. Over dosage may cause nausea, vomiting, diarrhea, head ache, stomach pain and confusion. Wintergreen might cause an allergic reaction in people who are allergic to aspirin or other salicylate compounds, or have asthma or nasal polyps. Use wintergreen with caution if you have one of these conditions (14).

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