LEMON BALM

Melissa officinalis L.

Family

Lamiaceae, the mint or sage family.

Parts Used

Herb.

Description

This perennial herb, native to southern Europe, grows and spreads so readily that some gardeners consider it a weed. It has a square stem (like all mints), simple lobed or non-lobed toothed leaves which are opposite and emit a fragrant lemon odour when bruised with a distinct lemon taste. The flowers are usually white but often pink and yellow and are held in a little tube-like cup.[1]

Traditional Use

The definition of balm is to heal and soothe, and this calming and delicious plant does just that. Melissa is from Greek meaning “honey bee” or “honey.” In Greek mythology Melissa was a nymph who shared the wisdom and honey of the bees. Lemon balm is a favourite plant of the bees. Not only does it produce lots of nectar, it’s also said to keep bees from swarming.[2]

Lemon balm has a documented medicinal history extending back to approximately 50 to 80 BC when it was traditionally thought of as a panacea herb. During the Renaissance Swiss alchemical physician Paracelsus said that lemon balm would completely revivify a man. Maude Grieve says the word balm is an abbreviation of balsam, the chief of sweet-

smelling oils, and is so called because of its honeyed sweetness. She said it was indicated for "all complaints supposed to proceed from a disordered state of the nervous system". She also quotes John Evelyn who wrote: "Balm is sovereign for the brain, strengthening the memory and powerfully chasing away melancholy". Balm steeped in wine "comforts the heart and driveth away melancholy and sadness." Grieve also touts lemon balm's longevity virtues by mentioning John Hussey who lived to the age of 116 and breakfasted for 50 years on balm tea sweetened with honey.[3,4]

Constituents

Lemon balm contains flavonoids (quercitrin, rhamnocitrin, luteolin), polyphenolic compounds (rosmarinic acid, caffeic acid and protocatechuic acid), monoterpenoid aldehyde, monoterpene glycosides, triterpenes (ursolic and oleanolic acids), sesquiterpenes, tannins and essential oils (citral).[5]

Actions

Relaxing nervine, anxiolytic, antidepressant, sedative, nootropic, nervine tonic, antimicrobial, antiviral, relaxing diaphoretic, febrifuge, carminative, aromatic digestant, anti-inflammatory, spasmolytic, antispasmodic, antioxidant.

Pharmacological Activity

Anxiolytic, Antidepressant and Sedative Activity

The results of a 2018 double-blind placebo-controlled clinical trial showed that eight weeks supplementation with 3g of lemon balm can decrease anxiety, depression, stress and sleep disorder in patients with chronic stable angina.[6]

A prospective, open label, 15-day study evaluated the efficacy of standardised lemon balm on stressed volunteers who had mild to moderate anxiety disorders and sleep disturbances. The primary outcomes showed improvement of symptoms. As much as 95% of the people (19/20) responded to treatment of which 70% (14/20) achieved full remission for anxiety, 85% (17/20) for insomnia and 70% (14/20) for both. The study demonstrated that chronic administration of lemon balm relieves stress related effects.[7]

Specific doses of lemon balm can improve cognitive performance and mood and may be a valuable adjunct in the treatment of Alzheimer's disease. The cognitive and mood effects of single doses of lemon balm were assessed in a randomised, placebo-controlled, double-blind, balanced crossover study. Following *in vitro* analysis, 20 healthy, young participants received single doses of 600, 1000 and 1600mg of encapsulated lemon balm, or a matching placebo, at seven day intervals. The most notable cognitive and mood effects were improved memory performance and increased calmness at all post dose time points for the highest (1600mg) dose. However, while the profile of results was overwhelmingly favourable for the highest dose, decrements in the speed of timed memory task performance and on a rapid visual information-processing task increased with decreasing dose.[8]

One of the same researchers published the results of a double-blind, placebo-controlled, randomised, balanced crossover experiment and found that 600mg of lemon balm resulted in ameliorated negative moods following simulated stress, with significantly increased self-ratings of calmness and reduced self-ratings of alertness. A significant increase in the speed of mathematical processing, with no reduction in accuracy, was observed after ingestion of the 300mg dose.[9]

An earlier randomised, placebo-controlled, double-blind, balanced crossover study investigated the acute effects on cognition and mood of a standardised extract of lemon balm. Twenty healthy, young participants received single doses of 300, 600 and 900mg of lemon balm or a matching placebo at seven day intervals. Results included a sustained improvement in accuracy of attention following 600mg of lemon balm and time and dose specific reductions in both secondary memory and working memory factors. Self-rated calmness was elevated at the earliest time points by the lowest dose, whilst alertness was significantly reduced at all time points following the highest dose.[10]

Antimicrobial (Antiviral, Antibacterial, Antifungal) Activity

A double-blind, placebo-controlled, randomised trial found that lemon balm cream applied to genital herpes healed the sores faster than placebo and relieved many of the uncomfortable symptoms. A

concentrated lemon balm cream was used topically on 66 patients with a history of recurrent herpes labialis (at least four episodes per year) or placebo. The cream had to be smeared on the affected area four times daily over five days. The significant difference in the combined symptom score on the second day of treatment is of particular importance because complaints in patients suffering from herpes labialis are usually most intensive at that time. In addition to the shortening of the healing period, the prevention of spreading the infection and the rapid effect on typical symptoms of herpes like itching, tingling, burning, stabbing, swelling, tautness and erythema, the lemon balm cream had a further advantage. The different mechanism of action of the lemon balm ruled out the development of resistance of the herpes virus. There was also evidence that the intervals between the periods with herpes might be prolonged with lemon balm cream treatment.[11]

One *in vitro* study looked at the effect lemon balm may have on drug-resistant strains of herpes simplex virus and reported that the penetration of herpes viruses into cells was inhibited by lemon balm at 80% and 96% for drug-sensitive and drug-resistant viruses, respectively.[12]

In a double-blind study the *in vitro* antiviral activity of lemon balm against herpes simplex infections was confirmed and it was shown to be effective at very early stages of the infection.[13]

In a recent *in vitro* study the anti-herpes activity of lemon balm was investigated and it was suggested that it possesses high virucidal activity against herpes simplex virus type 1 (cold sores), even at very low concentrations of 1.5µg/mL.[14]

A hydroalcoholic extract of lemon balm has inhibitory activity against the herpes simplex virus type 2 (HSV-2 or genital herpes) in comparison with the antiviral medication acyclovir. In the viral binding assay the extract did not prevent the entry of HSV-2 in the cells suggesting a mechanism of action subsequent to the penetration of the virus in the cell.[15]

Antispasmodic Activity

Efficacy of lemon balm in the treatment of infantile colic was evaluated in a randomised, double-blind, placebo-controlled trial. This study on 88 babies shows that colic in breastfed infants improves within one week with treatment with an extract based on lemon balm, chamomile *(Matricaria chamomilla)* and fennel *(Foeniculum vulgare)*.[16]

A randomised, double-blind, placebo-controlled trial found that young women taking 1200mg of lemon balm daily had significantly fewer premenstrual syndrome (PMS) symptoms than those taking placebo. The trial was performed on 100 high school girls from the first to the last day of their menstrual cycle for three consecutive cycles. Fifty girls received lemon balm and 50 received the placebo.[17]

Another double-blind clinical trial showed that young women taking 330mg of lemon balm three times daily at the beginning of their period had significantly less pain during menstruation than those taking placebo. Fifty-five girls were given the lemon balm and 55 placebo.[18]

Anti-inflammatory and Antioxidant Activity

Lemon balm modulates inflammation (key factors in the cause of heart disease) and has been shown to reduce harmful lipid levels in people diagnosed with type 2 diabetes in three recent trials.[19]

In a 2019 randomised double-blind placebo-controlled study 37 diabetic patients with dyslipidaemia, assigned to either lemon balm or placebo groups, received two 500mg capsules daily for three months. The study showed that lemon balm might be safe and beneficial in decreasing the serum triglyceride level in diabetic patients with dyslipidaemia.[20]

Another 2019 clinical trial showed that lemon balm is safe and effective in improvement of lipid profile, glycaemic control and reduction of inflammation in patients with type 2 diabetes. The randomised, placebo-controlled trial included 62 patients, receiving either 700mg/day lemon balm capsules, or placebo twice daily for 12 weeks.[21]

In 2018, 70 type 2 diabetic patients were randomly assigned to receive 350mg of lemon balm, or placebo, twice daily for 12 weeks. Lemon balm was safe and effective at improving the lipid binding proteins apolipoprotein (Apo)A-I, Apo B/Apo A-I and lipids ratios.[22]

An earlier study has shown significant benefit from lemon balm for decreasing benign heart palpitations. In the double-blind, randomised,

placebo-controlled clinical trial 55 patients received 14 days of treatment with 500mg twice a day of lemon balm or placebo. As well as reducing the frequency of palpitation episodes lemon balm also significantly reduced the number of anxious patients in comparison to the placebo.[23]

Lemon balm has the ability to scavenge both synthetic and natural free radicals. This is of significant importance as it indicates that it may have the potential to prevent oxidative damage *in vivo* by preventing free radical–mediated oxidative stress.[24]

Radiation exposure from x-rays can cause DNA damage and induce oxidative stress. Because the damage is cumulative this is especially problematic for people regularly exposed to x-rays. In a clinical trial lemon balm's ability to improve oxidative stress status was studied in 55 radiology staff exposed to persistent low dose radiation during work. They were asked to drink lemon balm infusion twice daily (1.5g tea bag/100mL) for 30 days. Oxidative stress markers were recorded before they began drinking the tea and again after the 30 days. Researchers recorded numerous improvements in oxidative stress markers, including a marked reduction in plasma DNA damage. It was concluded that lemon balm markedly improved oxidative stress and DNA damage in radiology staff when used as a dietary supplement for radiation protection.[25]

The ability to scavenge the free radical DPPH (2,2-diphenyl-1-picrylhydrazyl) was very high in lemon balm. It was suggested that lemon balm scavenged DPPH radical in a concentration dependent manner and it showed strong reducing power and a significant inhibition of deoxyribose (in DNA) degradation. The results suggest that lemon balm is a potential source of natural antioxidants and could be relevant for the management of oxidative stress. Of particular importance, for neurodegenerative diseases, the capacity of lemon balm to chelate and to maintain ferrous ion in a ferric ion state can contribute to its neurotherapeutic effects because iron plays a central role in brain damage.[26]

Numerous *in vitro* tests have shown positive results when assessing lemon balm's antiproliferative and antitumoural effects against certain cancer lines, including lung, colon, prostate and breast cancers. It's important to note that, as promising as these studies are, more research is needed to assess the effectiveness in actual cancer patients.[27]

Ultraviolet (UV) radiation is one of the main causes of skin cancer and photoaging (changes to the skin induced by chronic exposure to ultraviolet/UV sunlight). One *in vitro* study showed many benefits from lemon balm for protecting the skin, including a decrease in UVB-induced oxidative stress production and a reduction in UV-induced DNA damage.[27,28]

Other Activity

Traditionally lemon balm has been used to treat symptoms associated with hyperthyroidism such as tachycardia, insomnia and hyperactivity. Preclinical studies have shown that lemon balm is effective in blocking the binding of thyroid stimulating hormone (TSH) to the receptor by acting on the hormone and the receptor itself. There are many similarities between lemon balm and bugleweed (Lycopus virginicus) which have both been historically used to calm the heart and inhibit binding of TSH to thyroid follicles, block peripheral T4 deiodination and block stimulating autoantibodies of Graves' disease. Researchers suggest it will only inhibit an overactive thyroid and not one that is functioning normally.[29,30,31]

Indications

- Anxiety, nervousness, stress, insomnia, depression, chronic fatigue syndrome, tension headaches
- Improves cognitive function, dementia, Alzheimer's disease
- Dyspepsia associated with anxiety or depressive states, diarrhoea, flatulence, bloating
- Menstrual cramping, muscle tension
- Colds and influenza, fever, viral infections (topically for cold sore and chicken pox treatment)
- Hyperthyroidism, Graves' disease
- Radiation protection
- Heart disease, diabetes
- First aid for insect bites

Energetics

Some see the aromatic qualities of lemon balm as being warming and in Ayurveda the sour taste is generally seen as warming. However, in Western herbalism, lemon balm is often considered cooling and drying.[32]

Use in Pregnancy

Safety has not been scientifically established and is unknown. The tea beverage is considered safe in moderate amounts after the first trimester.[33,34]

Contraindications

Claims that lemon balm should be used cautiously in hypothyroidism are based on *in vitro* studies which cannot be extrapolated to human use. Human studies are needed to fully understand the implications of lemon balm in people with hypothyroidism. Monitor the use of lemon balm in these people.[35]

There is a 2015 case study of a 30 year old patient who was admitted to an emergency department with restlessness, tremor, distractibility and sweating following discontinuation of lemon balm consumption. These withdrawal symptoms may have been related to the dependence effect caused by long term use of lemon balm. As a result of this it is postulated that lemon balm may have a dependency risk and can lead to withdrawal symptoms when consumption is abruptly discontinued. The patient had purchased "melissa tea" (or lemon balm tea) from a herbalist two months prior in order to help treat his anxiety symptoms. He drank it regularly at night without combining it with another plant-based tea. He stated that he felt relief from anxiety after drinking the tea and felt restless and irritable when he did not consume the tea. Over the course of two months the amount of tea he consumed increased from one cup per day to four cups per day. His symptoms began 24 hours before being admitted to the emergency department and he did not drink any tea for the two days prior. On psychiatric examination he exhibited open conscious, normal orientation, anxious mood, internal restlessness, irritability and reported decreased sleep, appetite and concentration. He also experienced an increasingly strong craving for the "melissa tea". The patient had no history of major medical or mental illness and had no documented alcohol or drug use. His family history was unremarkable. In his physical and neurological examination there weren't any pathological findings except a postural tremor in both of the patient's hands. The report said withdrawal symptoms took place after stopping consumption of *Melissa officinalis*. According to the Naranjo Causality Scale (8) (the score was 6) the adverse effects were likely due to Melissa officinalis withdrawal. The patient was diagnosed as a case of "other substance withdrawal (*Melissa officinalis* - related)". The patient was followed up daily as an outpatient. Clonazepam (a benzodiazepine tranquiliser) was started (2mg/day) and continued for one week. His symptoms improved completely at the end a 10 day period. He maintained regular follow up care for six months and exhibited no symptoms of withdrawal in control examinations.[36]

Drug Interactions

Caution with alcohol, barbiturates and central nervous system depressants. Monitor with antidiabetic drugs and thyroid hormones.

Administration and Dosage

Liquid Extract:	1:1
Alcohol:	45%
Weekly Dosage:[37]	20 to 80mL

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