

## A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF ESSENTIAL OIL IN *NEPETA CATARIA*

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### ABSTRACT

*Nepeta cataria* (Catnip) is a member of the mint family (Lamiaceae). It is a perennial herb. Native to southern and eastern Europe, the Middle East, central Asia, and parts of China. It is widely naturalized in northern Europe, New Zealand, and North America. Essential oil of *Nepeta cataria* shows a wide range of pharmacological activities, also relaxant, antispasmodic, insect repellent, and allelopathic activities. The Essential oil of *Nepeta cataria* (L) also possess antioxidant and free radical scavenging activity, antimicrobial property, antifungal property. The paper reports on its pharmacological activities such as anti-oxidant, antimicrobial, antispasmodic and other effects.

**Keywords:** *Nepeta cataria*, Anti-oxidant, antimicrobial, antifungal, free radical scavenging, antispasmodic.

### INTRODUCTION

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesise hundreds of chemical compounds for functions. The compounds found in plants are of many kinds, but most are in four major biochemical classes: alkaloids, glycosides, polyphenols, and terpenes.<sup>1</sup>

Medicinal plants are the “backbone” of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis.<sup>2</sup> So in the recent past the practice of herbalism has got popularity around the globe including the developed countries due to its potency and apparent safety profile. More over some of the pathological condition where the scientific drugs become crippled but traditional herbal therapy can be a satisfying option which demands an ample amount of research.<sup>3</sup> The attempt is made to present an overview of phytochemical and pharmacological activities of the plant *Nepeta cataria* essential oil.

*Nepeta cataria* (catmint), family *Lamiaceae*, is native to eastern and southern Europe. It is also found in the Middle East, China and North America. The name catmint is derived from the strong attraction most cats have towards them. *Nepeta cataria* is a perennial herb, it used for ornamental, cooking purposes, and as a folk-

medicine. Its volatile oil used in perfumes and cosmetics industry. The essential oils content are varying during vegetation from 0.30 % to 1.2 % . Nepetalactone and citral are the main constituent of the essential oil.<sup>4</sup>

### AVAILABILITY<sup>5</sup>

Native to Eurasia, catnip plants can be grown in USDA plant hardiness zones 3 through 9. They do best in full sun to partial shade. Like so many herbs, this perennial thrives in poor soil that is well-drained. Catnip plants prefer a slightly alkaline soil but are not very fussy about the ground in which they grow, as long as their roots are not constantly sitting in water.

### PLANT<sup>6</sup>:

- **Growing form:** Perennial herb.
- **Height:** 20–100 cm (10–40 in.). Stem branched, 4-edged, densely woolly, greyish green. Lemony herb-like scent.
- **Flower:** Corolla irregular (zygomorphic), dirty white with red spots, 7–10 mm (0.28–0.4 in.) long, fused, long-tubed, bilabiate. Upper lip 2-lobed, short, flat; lower lip 3-lobed, central lobe bigger than lateral lobes. Calyx oval-cylindrical, slightly curved, 5-lobed, 15-veined, greyish green. Stamens 4, of which 2 long and 2 short. Gynoecium composed

of 2 fused carpels. Inflorescence spiked; a dense whorl.

- **Leaves:** Opposite, long-stemmed. Blade cordate–ovate, with tapering tips, hairy, large-toothed. inflorescence's lowest subtending bracts similar to stem leaves, upper ones small, narrow.
- **Fruit:** 4-parted schizocarp.
- **Habitat:** Yards, gardens, waste ground, roadsides, ruins, loading areas. Left over from old gardens and an established alien.
- **Flowering time:** July–August.



*Nepeta cataria* plant

### CHEMICAL CONSTITUENTS

The main constituents so far identified, include  $\beta$ -caryophyllene, caryophyllene oxide, 1,8 – cineol, citronellol, geraniol, elemol, nerol, nerolidol, spathulenol,  $\beta$ -elemene, geranyl acetate, citronellyl acetate and geranial. The major constituents is nepetalactones and also contain alkaloids, flavonoids, tannins. Actinidine and iridomyrmecine.<sup>7</sup>

The plant terpenoid nepetalactone is the main chemical constituent of the essential oil of *Nepeta cataria*.

The oil was found to comprise mainly of citronellol (11.44–16.73%), nerol (19.95–30.70%), geraniol (25.13–31.00%) and geranial (4.93–11.05%). The major components of *N. cataria* oil were 4 $\alpha$ - $\alpha$ , 7 $\alpha$ - $\beta$ -nepetalactone (28.8%), 1,8–cineole (13.5%), 4 $\alpha$ - $\alpha$ , 7 $\beta$ , 7 $\alpha$ - $\alpha$ -nepetalactone (11.9%), (E)-caryophyllene (5.7%) and citronellyl acetate (5.2%).<sup>8</sup>

Besides the already known nepetalactones 4 $\alpha\alpha$ , 7 $\alpha$ , 7 $\alpha\alpha$ -nepetalactone; 3,4 $\beta$ -dihydro-4 $\alpha\alpha$ , 7 $\alpha$ , 7 $\alpha\alpha$ -nepetalactone; 4 $\alpha\alpha$ , 7 $\alpha$ , 7 $\alpha\beta$ -nepetalactone and  $\beta$ -caryophyllene, five new constituents were identified: dimethyl-3,7 oxo-1 bicyclo [3,3,0] oct-2-ene, piperitone, thymol methyl ether, hexenyl benzoate and

humulene oxide.  $\alpha$ -humulene (1.27%),  $\beta$ -farnesene (2.14%),  $\alpha$ -Pinene, Sabinene.<sup>9</sup>

### THERAPEUTICAL USES

This essential oil also assists in stimulating the nervous, circulatory and excretory systems.

Catnip oil works as a:

- **Sedative:** relaxes the mind to free it from insomnia, tension and anxiety
- **Carminative:** removes intestinal gases via a downward motion
- **Diuretic:** promotes nutrition
- **Nervine:** serves as a tonic for the nerves
- **Emmenagogue:** regulates menstruation.
- **Diaphoretic:** makes you sweat to reduce weight and blood pressure, remove salt and excess toxins in the body and keep your heart healthy.<sup>10</sup>
- Some other medicinal uses for catnip include anesthetic, antibiotic, anti-rheumatic, astringent, muscular aches and pains, rheumatism, chills, cold in the joints, hemorrhoids, toothache.<sup>11</sup>
- More importantly, *Nepeta cataria* oil has been known to help alleviate fever, migraine, dyspepsia, colic, ulcers, spasmodic cholera and nervous system disorders. The oil can help ease muscular, intestinal, respiratory or menstrual cramps.

Today, catnip essential oil is used as:

- **Medicine:** It was shown to have antibiotic and astringent properties.
- **Insect repellent:** catnip oil was shown to be more effective in repelling mosquitoes compared to DEET, the most common ingredient in pesticides and insect repellents.
- Using catnip oil is a good choice because of its many health benefits. For one, it can help tighten your skin, muscles and gums, make sure that bile and gastric juices and acids flow properly inside the stomach and keep your scalp healthy minus the dandruff. Catnip oil can stimulate your appetite before meals and promote hormone production.

### PHARMACOLOGICAL ACTIVITIES

**ANTIMICROBIAL PROPERTY:** The EOs of *N. cataria* are rich in nepetalactones and have been reported to have antibacterial. EOs exhibited antimicrobial activities against the food-borne pathogens. the EO of *N. cataria* can possibly be used in food products as a natural preservative agent.<sup>12</sup>

**ANTI DEPRESSANT ACTIVITY:** Catnip has also been used in the treatment of some

depressive disorders. The results showed that repeated feeding and acute and repeated administration with the apolar extract reduced immobility in the behavioral despair test. These data suggest that *N. cataria* has antidepressant properties.<sup>13</sup>

**ANTINOCICEPTIVE AND ANTI-INFLAMMATORY EFFECTS:** Concerning the different effects of essential oils from *Nepeta* genus on the central nervous system including pain killing effect. The essential oil of *Nepeta cataria* minimize both the acute and chronic forms of nociception and may have potent role against inflammation.<sup>14</sup>

**ALZHEIMER'S DISEASE:** *Nepeta cataria* elicits the anti-amnesic effects, its influence on central cholinergic activity by estimating the whole brain acetylcholinesterase activity. EONC significantly decreased acetylcholinesterase activity. It indicates that essential oil of *Nepeta cataria* might prove to be a useful memory restorative agent in the treatment of dementia seen in elderly. The underlying mechanism of action may be attributed to its anti acetylcholinesterase property.<sup>15</sup>

**NEPETA CATARIA INCREASES PENILE ERECTION:** *Nepeta cataria* treatment increased male rat's penile erection. A slightly facilitation on male rat sexual behavior and a decreased in general activity of NC. *Nepeta cataria* increases penile erection and slightly improves male rat sexual behavior by an action on dopaminergic systems.<sup>16</sup>

**ANTI-OXIDANT PROPERTY:** Antioxidants are emerging as prophylactic and therapeutic agents for various diseases. Antioxidant property of the extract from *Nepeta cataria*, a medicinally useful traditional medicinal herb. the antioxidant capacity of ethanolic extracts prepared from *Nepeta cataria* was evaluated. The results demonstrate that *Nepeta cataria* extracts examined in this article exhibit antioxidant activity. This activity is correlated with the total phenolic compounds content in the extract which implicates that the *Nepeta cataria* extract may serve as potential natural source of antioxidants.<sup>17</sup>

**SPASMOLYTIC AND BRONCHODILATORY PROPERTIES:** *Nepeta cataria* possesses spasmolytic and myorelaxant activities mediated possibly through dual inhibition of calcium channels and PDE, the chemical composition of the essential oil and to explore the mechanism involved in the medicinal use

of the plant for hyperactive gut and respiratory disorders, such as colic, diarrhea, cough and asthma.<sup>18</sup>

## CONCLUSION

The present review reveals the description, active constituents, therapeutic uses and pharmacological activities of Essential oil of *Nepeta cataria*. The plant terpenoid nepetalactone is the main chemical constituent of the Essential oil of *Nepeta cataria* and also contain alkaloids, flavonoids, tannins.

The Essential oil of *Nepeta cataria* (L) has been studied for its various pharmacological activities like antioxidant, free radical scavenging activity, Sedative, anti-rheumatic, Carminative, Emmenagogue, Diaphoretic. The EO's of *N. cataria* are rich in nepetalactones and have been reported to have antibacterial property. Because of this property, it is used as a preservative in some preparations. More importantly, *Nepeta cataria* oil has been known to help alleviate fever, migraine, dyspepsia, colic, ulcers, spasmodic cholera and nervous system disorders. The oil can help ease muscular, intestinal, respiratory or menstrual cramps. Further studies and investigations can be performed on the plant for its various pharmacological activities.

## REFERENCES

1. Zahid, Dr.Mahtab Alam Khan. Introduction and importance of medicinal plants and herbs. May 20, 2016.
2. Maryam Ahvazi, Farahnaz Khalighi-sigaroodi. Introduction of medicinal plants species with the most traditional usage in Alamut region. Iranian journal of pharmaceutical research.2012;11(1):185-194.
3. Gupta M, Biswas TK, Saha S and Debnath PK, Therapeutic utilization of secretory products of some Indian medicinal plants: A review, Indian J Trad knowledge 2006;5(4):569-575.
4. Mohamed E.Ibrahim, Salma A.El. Sawi and Faten M.Ibrahim. *Nepeta cataria* L, one of the promising aromatic plants in Egypt:seed Germination, Growth and essential oil production.2017;8(6):1990-95.
5. Manisha Sarkar, Rajat Rashmi, Vikramaditya and P N varma. Pharmacognosy of *Nepeta cataria*. 4 April 1995:225-234.

6. Suomi, Svenska, Deutsch, Dansk, Francais, Espanol. Catnip, *Nepeta cataria*- flowers-NatureGate-Luontoportti.[www.luontoportti.com](http://www.luontoportti.com).
7. Anwar H Gilani, Abdul J.shah, Amina zubair. Chemical composition and mechanism underlying the spasmolytic and bronchodilatory properties of the essential oil of *Nepeta Cataria* L. Journal of Ethnopharmacology.2009;121:405-411.
8. DIY Kitty Crack: ultra-potent catnip extract. Instructables. 3 June 2007. Retrieved 14 February 2009.
9. Katayoun Morteza-semnani and Madjid saeedi. Essential oil composition of *Nepeta cataria* and *Nepeta crassifolia* Boiss and Buhse from iran.2013;12(3):120-124.
10. William N Setzer. Catnip essential oil. There is more to it than making your cat go crazy. American journal of Essential oils and Natural products.2016;4(4):12-15.
11. Bourrel, F.perineau, G.Michel and J. M.Bessiere. Catnip (*Nepeta cataria*) Essential: Analysis of chemical constituents, Bacteriostatic and Fungistatic properties.2011:159-167.
12. KamiarZomorodian, Mohammad Jamal saharkhiz. Chemical composition and antimicrobial activities of essential oils from *Nepeta cataria* against common causes of food-borne infections.2012.
13. Maria Martha Bernardi, Thiago Berti Kirsten. Antidepressant like effects of an apolar extract and how enriched with nepeta cataria in mice.2010;3(2):251-258.
14. Taskina Ali, Mohammad Javan. Evaluation of the antinociceptive and anti-inflammatory effects of essential oil of *Nepeta* species.Daru journal of pharmaceutical sciences.2012;20:48.
15. Satish s: Studies on Therapeutic Potential of Essential Oils of *Nepeta Cataria* in Treatment of Alzheimer's Disease. Asian Journal of Biomedical and Pharmaceutical Sciences; 2013;3(18):42-48.
16. Maria Martha Bernardi, ThiagoBerti Kirsten. *Nepeta cataria*L.Var.citriodora increases penile erection in rats.2010.
17. Isa Gokce. Antioxidant capacity of *Nepeta cataria*. Asian journal of chemistry.2010;22(4):2833-2839.
18. Anwar H Gilani, Abdul J.shah, Amina zubair. Chemical composition and mechanism underlying the spasmolytic and bronchodilatory properties of the essential oil of *Nepeta Cataria* L. Journal of Ethnopharmacology.2009;121:405-411.