

## Phyto-Pharmacological Effect of Nine Medicinal Plants as a Traditional Treatment on Depression

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Received date: May 22, 2017; Accepted date: May 26, 2017; Published date: June 06, 2017

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### Abstract

Anxiety, stress and depression are characterized by widespread and highly comorbid psychiatric conditions in the world that are defined as a negative emotional experience and are associated with biochemical, cognitive, behavioural and psychological changes. Herbal medicine has been widely used among suffering and anxiety disorders since ancient times. The modern pharmacological therapy is costly and associated with multiple side effects resulting in patient non-compliance. Thus there is a need to explore alternative therapies particularly from herbal sources as these are cost effective and possess minimal side effects. This review investigates the available studies on the pharmacological effects of some medicinal plants on depression. The studied plants include: *Melissa officinalis*, *Lavandula angustifolia*, *Cinnamomum zeylanicum*, *Viola odorata*, *Echium amoneum*, *Valeriana officinalis*, *Aloysia triphylla*, *Citrus aurantium* and *Salix aegyptica*. The present article is a comprehensive review of the pharmacological properties, especially anti-depressants, anti-anxiety of nine medicinal plants that could be useful for clinical studies to produce an herbal product which use treat depression.

### Key Words:

Medicinal Plants; Anxiety; Depression; Nervous Disorders; Insomnia

### Introduction

Recently, the notice to the herbal medicine research and the medicinal plant effects on human health to treat different neurological diseases like depression has increased [1]. Using of medicinal plants had been coming from early times [2]. As a rule, they are used to control mental problems and the soothing agents, antidepressant effects [3], anticonvulsants [4] anxiolytic and others [5-8]. Depression has become a common psychological illness in recent years. According to an investigation by the World Health Organization International Consortium of Psychiatric Epidemiology (WHO-ICPE), 6.3–15.7% of the world's population has been estimated to get depression once in their life [9]. The studies were shown that depression will be the second important disease after cardiovascular disease in the world by the year 2020. Although a wide variety of antidepressant drugs are available to treat depression, most of the synthetic drugs are not without side effects. Therefore, the search for regularly eaten foods with an antidepressant activity seems to be an essential approach to finding an effective antidepressant treatment without side effects. Recently, new research indicated that using of medicinal plants has increased in psychiatry [10]. In Iranian and other traditional medicines, an antidepressant effect has been indicated for some medicinal plants. These include lemon balm (*Melissa officinalis*), lavender (*Lavandula angustifolia*), Cinnamon (*Cinnamomum zeylanicum*), Banafsha (*Viola Odorata*), Echium (*Echium amoneum*), valerian (*Valeriana officinalis*), Aloysia (*Aloysia triphylla*), Citrus (*Citrus aurantium*) and Salix (*Salix aegyptica*) [11,12]. Using of the combination of the essential oil of different medicinal plants as a single treatment is common in traditional medicines. For example, in France there is a combination of three medicinal plants (*Passiflora incarnata*, *Valeriana officinalis*,

*Crataegus oxyacantha*) that use as an anti-Anxiety treatment [13]. In Chinese traditional medicine, using of the combination of different herbal medicine is mostly common [14]. This review investigates some medicinal plant that can be used in the depression treatment.

### Phytopharmacological Effects of Nine Medicinal Plants

#### *Aloysia triphylla*

*Aloysia triphylla* (lemon verbena) is a medicinal plant from Verbenaceae family. It is a perennial plant and native to the western South America. It has been used in the traditional medicine from early times for some therapeutic effects as well as depression [15]. The plant has tonic effect upon the nervous system and has reputation for soothing abdominal discomfort [16]. On the other hand, *Aloysia triphylla* also has been reported for antioxidant [17], anti-inflammatory and analgesic effects [18]. The therapeutic value of *Aloysia triphylla* is due to two compounds: Hesperidin and Artemitin [19]. These two compounds are flavonoids [20] with several mechanisms such as abatement of histamine release, abatement of eicosanoid synthesis and effects on the nervous systems to treat depression [21-23].

#### *Citrus aurantium*

*Citrus aurantium* (sour orange) from Rosacea family. In many countries, it has been used in folk medicine such as Brazilian traditional medicine for its therapeutic effects like antidepressant, anti-anxiety and anticonvulsant due to its effect on the central nervous system [24,25]. A total of 22 phenolic compounds were identified in bitter orange seeds, including hydroxybenzoic acids, hydroxycinnamic acids, flavanones, flavanols, flavonols, flavones, simple phenol and coumarin [26]. Some clinical studies reported that the essential oil of *Citrus aurantium* has been affected on anxiety and depression [27].

Based on the positive effects of herbal essential oils on depression and anxiety and due to the side effects of chemical drugs, they can be a good alternative to chemical drugs [28].

### ***Echium amoenum***

*Echium amoenum* (Boraginaceae) is an important medicinal plant in Iranian folk medicine [29]. It has been used as an antidepressant, analgesic, antioxidant, antibacterial treatment as well as cough and sore throat [30,31]. It has been reported in some researches that *Echium amoenum* essential oil can be used as a treatment for obsessive-compulsive disorder [32]. The studies showed that the petals of *E. amoenum* are contained phenolic compounds such as sanding, defending and rosmarinic acid [33]. The petals of *Echium amoenum* contain Cyanidin 3-glucoside that is the most important common anthocyanin moderate cyclooxygenase-2 expressions by inhibiting activation, translocation of c-Jun and NF-κB factors into nucleus and the production of PGE2 [34]. Based on a clinical research, the neuroprotective effect of cyanidin 3-glucoside has been evaluated [35].

### ***Lavandula angustifolia***

Lavender (*Lavandula angustifolia* Mill.) is a famous herb that has a long history in folk medicine and is still therapeutically used today. The essential oil obtained by steam distillation from the fresh flowering tops of this plant is often used in aromatherapy as a relaxant [36]. Inhalation of the vapour of the lavender essential oil and its main constituent, linalool, has shown sedative effects in both human and animal studies [37]. Other pharmacological effects of this oil, including anticonvulsive [38] anxiolytic [39], antidepressant [40], and anticonflict effects [41], have also been reported. On the other hand, lavender is also used as a tea infusion (i.e., aqueous extracts) to treat restlessness, insomnia, and nervous disorders of the stomach and intestines [42]. Furthermore, lavender contains aqueous phenolic constituents, such as hydroxycinnamic acids and flavone glycosides [43], which have been associated with the antioxidant activities of Lamiaceae plants including lavender [44].

### ***Melissa officinalis***

*Melissa officinalis* (Lemon balm) from Lamiaceae family is a medicinal plant that is native to the western Asia and eastern Mediterranean and also known as “Badranjboyeh” in Iran, and grows widely in provinces of Tehran, Golestan, Azarbayjan, Lorestan and Kermanshah [45]. In the traditional medicine the aerial parts of this plant, especially leaves are used for medical purposed. It can be used for different therapeutic effects such as carminative, antidepressant, Alzheimer, anti-anxiety, surgical dressing for wounds, sedative-hypnotic, diuretic and antispasmodic as well as nerve calming and spasmolytic effects [46]. Also in Iranian folk medicine, the using of *Melissa officinalis* use for nervousness, depression and lack of energy in young girls [47-50]. Researches showed that the important components of the extract of lemon balm are citronellal (39%), geranial (2%) and citral (citronellol, linalool) (33%). The extract also contains phenol carbon-acid (rosmarinic acid), flavonglychoside acids and as threeterpinene (3).

### ***Salix aegyptiaca***

*Salix aegyptiaca* (Musk Willow) belongs to Salicaceae family. It is native to Southwest Asia. In Iran it is found in some province. The

flowers are important parts of the plant for therapeutic purposes that separate to male flower and female flower and each plant only has one sex [51]. In Iranian traditional medicine the male inflorescences distillate has been used to treat depression, anemia, vertigo, as well as cardiovascular problems. Based on the researches, the main compounds of the inflorescences extracts are phenolic compounds such as caffeic acid, quercetin, rutin, salicin, epigallocatechin gallate, gallic acid, p-coumaric acid, myricetin, catechin and vanillin. On the other hand, inflorescences distillate can be used as sedative, laxative, somnolent, gastroprotection, aphrodisiac, orexigenic as well as carminative [52].

### ***Valeriana officinalis***

*Valeriana officinalis* is a medicinal plant belongs to Valerianaceae family that also called Valerian. Valerian is native to Asia and Europe and has been introduced into the North America. In the traditional folk medicine the root extract of Valerian has been used as an antidepressant, anxiolytic, sedative insomnia, anxiety and sleep disorders treatment. The therapeutic properties are due to main active compounds that are present in the extract such as valenol, valepotriates, baldrinals valerenic as well as a few alkaloids [53-58].

### ***Viola odorata***

*Viola odorata* (Sweet violet) is an herbal plant from the Violaceae family. It is native to Asia and Europe and also introduced to North America and Australia [59]. In traditional Iranian folk medicine it has been used to treat depression respiratory ailments, congestion, sore throat, insomnia, anxiety blood pressure as well as coughs [60,61]. Sweet violet contains glycoside, mucilage, methyl salicylate as well as alkaloid [61]. Based on recent studies, the main compounds in the Violet's leaves are glycoside of salicylic acid that has been used for to treat body pains and headaches. Also, Violet's flower has been used as an antidepressant, anti-insomnia laxative, lipid-lowering, anti-inflammatory, blood pressure lowering and anti-septic treatment [62].

### ***Cinnamomum verum***

*Cinnamomum verum* (cinnamon) is a small evergreen tree from Lauraceae family. Cinnamon is native to Sri Lanka. It has a lot of therapeutic effect such as antidepressants, anti-microbial, antioxidant and anti-viral. Cinnamaldehyde and proanthocyanidins are the major compounds of cinnamon's essential oil that cause of many therapeutic effects [63,64]. Procyanidins (procyanidin A-type and B-type linkages) and catechins are present in the cinnamon's barks and use for the antioxidant activities [65]. In addition, some studies reported that cinnamon can reduce the risks of colon cancer by improving the colon's health [66].

### **Future Direction**

Considering therapeutic potential of these nine medicinal plants in terms of their efficacy and adaptability is such that combination of them as one organic product can be noticed in future, since depression is becoming more epidemic around the world especially in developing countries as an organic product by using local knowledge can reduce many problems associated with the use of chemical drugs and their side effects to a large extent (Table 1).

Plant	Plant Part used	Bioactive Compounds	Screened Activity
Aloysia triphylla	Roots	Flavonoids (Artemitin and Hesperidin)	Antidepressant, anti-inflammatory [23]
Citrus aurantium	Flowers	Phenolic compounds like flavanone glycosides, hydroxycinnamic acids	Antidepressant, anticonvulsant, antianxiety, antioxidant [24]
Echium amoneum	Leaves and flowers	Phenolic compounds like rosmarinic acid, cyanidin, and delphinidin	Antidepressant, anti-hyperlipidemia, anti-cholesterol, antibacterial, anti-diabetic and antioxidant [30,31]
Lavandula angustifolia	Flowers	Phenolic compounds like hydroxycinnamic acids and flavone glycosides	Antidepressant, anticonvulsive, anxiolytic, antioxidant [40]
Melissa officinalis	Leaves and stems	Citronellal, citral (citronellol, linalool), geranial, threeterpinene, phenol carbon-acid (rosmarinic acid), and flavonglycoside acids	Antidepressant, antimicrobial, antispasmodic, antioxidant [47]
Salix aegyptiaca	Leaves and stem bark	Phenolic compounds like gallic acid, caffeic acid, vanillin and p-coumaric acid, myricetin, catechin, epigallocatechin gallate, rutin, quercetin and salicin	Antidepressant, antioxidant, anti-vertigo, anti-anemia [52]
Viola odorata	Leaves and flowers	Alkaloid, glycoside, saponins, methyl salicylate, mucilage and vitamin C, Cycloviolacin O2 (CyO2)	Antidepressant, anti-hyperlipidemia, anti-cholesterol, anti-blood pressure, anti-cancer and anti-tumor [60]
Valeriana officinalis	Leaves	Alkaloid, glycoside, saponins, methyl salicylate and mucilage	Antidepressant, antioxidant, anti-inflammatory, laxative, anti-septic, anti-hyperlipidemia [57]
Cinnamomum zeylanicum	Stem bark and leaves	Eugenol, Cinnamaldehyde, camphor, procyanidins and catechins	Antidepressant, antimicrobial, antioxidant, anti-diabetic and anti-inflammatory [66]

**Table 1:** Nine medicinal plants with evidence of their activities.

## Acknowledgements

Author is grateful to Parsiteb Kohan Company (Paprika) for their support and providing necessary facilities to carry the research.

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