

Melissa parviflora Benth. A Review on its Ethnobotany, Phytochemistry and Pharmacological profile

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ABSTRACT

Melissa parviflora Benth. is an aromatic perennial herb of Lamiaceae family. It is one of the most influential plant and used from centuries in Unani system of medicine for the treatment of various malady such as Epilepsy (*mirgi*), hemiplegia (*fali*), migraine (*shaqeeqa*), insomnia (*sehar*), indigestion (*sue hazm*) and palpitation (*khafqaan*) etc. The Persian physician Avicenna endorsed it for heart problems. It has antitubercular, antipyretic, analgesic and stomachic properties, also used to remove bad breath from mouth, strengthen the gums but its main action is as a tranquillizer and nervine relaxant, it is greatly esteemed for its calming properties. Preliminary performed phytochemical analysis revealed that tannin, flavonoid and saponins are the major components of the plant extract. The plants containing saponins or flavonoids exhibit anticonvulsant activity whereas the flavonoids show various biological activities including antioxidant, anti-inflammatory and cytotoxic-antitumor etc. Keeping in view the tremendous medicinal importance of the plant Badranjboya in Unani Medicine, this review provides updated information on its phytochemistry, therapeutic uses and pharmacological properties.

Keywords: *Melissa parviflora* Benth, Phytochemistry, Therapeutic uses

INTRODUCTION

Melissa parviflora Benth., belongs to the family Lamiaceae, commonly called as gentle balm, lemon balm, is an aromatic perennial, erect, pubescent or glabrate herb ascending upto 15-40cm high. It has about 3500 species, native to the eastern Mediterranean region and western Asia, widely cultivated in Europe. In eleventh century Persian physician, Avicenna (Ibn Sina) advocates the use of Lemon balm in treating depression/melancholy (Wong et al., 1998). In Unani system of medicine Badranjboya is used for treating various diseases such as depression/anxiety, insomnia (*Saheer*), dyspepsia (*Sue hazam*), migraine (*Shaqeeqa*), leprosy (Juzam), palpitation (*Khafqaan*) and epilepsy (*Mirgi*) etc. It is also used in liver diseases, weakness of eyesight, halitosis and in sinusitis. The Avicenna recommended it for heart problems but its main action is as a tranquillizer. It relieves tension, stress and is extensively appraised for its calming properties (Kennedy L et al., 2004). Its tonic effect towards the heart and circulatory system causing mild vasodilation of peripheral vessels, hence lowering blood pressure. Also have an effect on the thyroid gland and has been used to treat hyperthyroidism (Aufmkolk M et al., 1985). Traditionally, it used as stimulant tonic, carminative, antispasmodic, emmenagogue and aphrodisiac, used in hysteria, colic, amenorrhoea and toothache (Khare CP, 2004). A number of pharmacological activities like antifungal,

anti-inflammatory, antipyretic, antiplasmodial, hypotensive, hypocholesterolemic, CNS depressant and sedative activities etc (Arora et al., 1969; Arora RB et al., 1988; Agarwal, 1972; Dua VK et al., 2011; Agarwal OP et al., 1982; Gaur RD, 1990; Ahmad N.,2004; Sharma A et al., 1977) have been reported for *Melissa parviflora*. The major phytoconstituents of this plant are tannin, alkaloid, flavonoid, saponin and phenolic compounds. Preliminary phytochemical analysis showed that saponin, flavonoid and tannin are the main component of the extract. The plants containing flavonoids or saponins exhibit anticonvulsant activity whereas the flavonoids show various activities such as anti-inflammatory, antioxidant and cytotoxic antitumor activity (Kumar AS and Gandhimathi R, 2009; Babu BH et al., 2003; Mattson RH, 1992); Chauhan AK et al., 1988; Di Carlo G et al., 1999; Kokate CK, 1994). Hence this review article provides updated information on its phytochemistry, therapeutic uses and pharmacological properties.

Scientific Classification (United State Department of Agriculture)

Kingdom	Plantae
Subkingdom	Viridiaeplantae
Phylum	Magnoliophyta
Subphylum	Euphylllophytina
Infraphylum	Radiatopses
Class	Magnoliopsida
Subclass	Lamiidae
Superorder	Lamianae
Order	Lamiales
Family	Lamiaceae
Genus	Melissa
Specific epithet	Parviflora – Salisb
Botanical name	<i>Melissa parviflora</i>

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Vernacular Names (Kirtikar and Basu, 1987; Kennedy DO and A.B.Scholey, 2006; Nadkarni, 1989)

Arabic	Baadhranjooya,
Chinese	Xiang Feng Cao
German	Melisse
Hindi Name	Billilotan
Kashmiri Name	GandhSoi
Latin Name	Melissa parviflora Benth.
Persian Name	Badrangboya, Faranjmushuk
Albanian	Spelinok
Chinese	Heung fungchou
German	Melisse, Zitronenmeli
Hebrew	Meliss
Spanish	Toronjil
Urdu Name	Badranjboya



Fig. 1 Image of plant Badranjboya (*Melissa parviflora*)

Habitat and Distribution

An erect, pubescent or glabrate herb 60-100cm high found in the temperate Himalayan region from Garhwal to Sikkim, Darjeeling and Khasi, Aka and Mishmi hills ,at an altitude of 1200-3000 m (Nadkarni, 1989; Kirtikar and Basu, 1987).

Mahiyat (Unani Description of Badranjboya)

It is a perennial herb usually aromatic in nature, mildly bitter in taste. Cats love its smell after seeing it they do strange activities and due to this it is also known as Bililotan. It is of two types (Ghani MN, 1921).

Small Type

This type is generally cultivated yearly in summer. Leaves are small, soft, base is rounded and branches are numerous. Flowers are blue red in colour and are sometimes used for preparation of food. Its seeds are clay coloured and just like Tukhme alsı (*Linium ussitasium*) but smaller than it. This type is also called as Bakhla, Tranjan and Atrang.

Big Type

Most of the Unani eminent scholars say that this is the main Badranjboya. This type is usually aromatic, green in colour, smell is lemon like. Leaves are short rounded, greenish in colour. Flowers are white or bluish white. Seeds are less in this type and black in colour, root buds grow yearly into branches and usually grow in wet and salty soil. Due to its aroma cats like this type and do strange activities after seeing this (Ghani MN, 1921; Ibn Baitar, 1985).

MORPHOLOGY OF BADRANJBOYA (*MELISSA PARVIFLORA*)

Macroscopic

Leaves are broadly ovate or ovate-lanceolate, base acute round or cordate; opposite, rarely whorled or alternate, simple to pinnately dissected or compound. Petioles are 6-25mm, slender. Whorls are numerous or few or many. The petiole varies in length from 1-1.2cm while the lamina is about 2.5x1-3.5x1.2cm. The raw drug occurs in broken pieces of 1-2cm long and admixed with other plant parts. The proximal portion is thick which gradually gets thinner towards distal side. Small, thin branches emerge out from the tap root. Root is dull greyish black in colour and is easily broken. Taste is slight bitter without any smell (Anonymous, 1986).

Microscopic

Transverse section of leaf shows single layered upper and lower epidermis provided with glandular and non glandular hairs. The glandular hairs are characterized by the presence of unicellular circular head and uni to multi celled tail. The non glandular hairs are unbranched, uni seriate, multicellular, with the outer most cells tapering. These are ornamented with small bristles. Upper epidermal cells are mostly larger than lower ones, while both are covered with thick cuticles. The epidermis is followed by single layered palisade tissue continuous to lamina whereas it discontinues at the veins or midrib which is replaced by 3to 4 layered collenchymatous tissue on the upper side and three to six layered on the lower side of leaf. The collenchyma is followed by circular parenchyma tissue with large intercellular spaces. Vascular bundle is kidney shaped and is collateral. The vessel members are mostly with spiral to reticulate thickenings with simple perforation plates and tracheid's are mostly pitted. The stomata are indistinct. The cross-section of about 3mm diameter root is almost circular in outline. The cortex cells are either absent or scantily developed. The secondary cortex is 3 to 4 layered thick parenchymatous and mostly transversely elongated. The pericycle fibers are present and found in groups of 2-4 cells or even more. This layer is followed by a thin zone of secondary phloem.

Cambium is indistinct. Secondary xylem consists mostly of vessels, tracheids and parenchyma.

Parts Used

Whole plant (Anonymous, 1986)

Maza (Taste)

Mildly bitter (Ghani MN, 1921; Kirtikar and Basu, 1987)

Mizaj (Temperament)

Hot² and Dry² (Ghani MN, 1921; Anonymous, 1986; Ibn Baitar, 1985; Kabiruddin H, 1955)

Hot³ and Dry³ (Ibn Sina, 1927)

Mode of Administration

Local & Oral (Ghani MN, 1921; Kabiruddin H, 1955; Ibn Baitar, 1985; Lubhaya RH, 1984)

MuzirAsrat (Adverse effects)

Adverse effects on Kidney and Liver (Ghani MN, 1921; Kabiruddin H, 1955)

Musleh (Corrective)

Following drugs have been recommended to be used along with *Melissa parviflora* so as to avoid its adverse effects: Samage arabi (*Acacia arabica*), Kundur (*Boswalia serrata*), Badiyan (*Foeniculum vulgare*), Poste Anar (*Punica granatum*), Rebas (*Rheum officinalis*) (Ghani MN, 1921; Kabiruddin H, 1955).

Badal (Substitute)

Abrashem (*Bombax mori*), Poste Turanj (*Citrus medica*), Faranjmushak (*Ocimum gratissimum*), Marzanjosh (*Origanum vulgare*) (Ghani MN, 1921; Kabiruddin H, 1955; Ibn Baitar, 1985).

MiqdareKhurak (Therapeutic dose)

5-7g (Ghani MN, 1921; Anonymous, 1986)

Murakkabat (Compound Formulations)

JawarishOodTursh, JawarishFawaq, JawarishMastagi, DawaulMushkHaarSada, DawaulMushkMotadilJawharWali, DawaulMushkMotadilSada, Sharbat Ahmad Shahi, SharbateGauzaban, Sharbate Mus-hil, SharbateAbrashemSada, ArqiFawaq, ArqiMaa-ulAmbri, ArqiMakoKasni Wala, MajooneKundur, MufarheAzam, MuffarheYakutiMoatadil, MuffarheDilkhusha, KhameeraAbreshamSada, KhameeraGauzabanAmbri, KhameeraAbreshemOodeMastagi Wala, KhameeraMarwarid (Anonymous, 1986; Lubhaya RH, 1984; Ghani MN, 1921).

Phytochemistry of *Melissa Parviflora*

Review of literature reveals the presences of following chemical constituents:

Caffeic acid (a tannin), several flavonoids (luteolin-7-O-glucoside, isoquercitrin, apigenin-7-O-glucoside, and rhamnocitrin), 5 rosmarinic acid, 6 ferulic acid, 7 methyl carnosate, 8 hydroxycinnamic acid, 8 and 2-(3',4'-dihydroxyphenyl)-1,3-benzodioxole-5-aldehyde.³

The essential oil contains various aldehydes: geranial (the major constituent in oil), citronellol, beta-caryophyllene, neral and geranyl acetate (Duke JA, 2007).

It's lemony flavour and aroma are largely due to citrol and citronellol, although other phytochemicals, including geraniol and linalool also contribute to its scent (Taibi DM and CA Landis, 2008).

It is high in flavonoids, which can have an antioxidant effect. Other phytochemicals which may provide antioxidant activity includes phenolic acids, terpenes, rosmarinic acid and caffeic acids. Also contains tannins, which are astringent and contribute to its antiviral effects, and eugenol acetate, which is believed to be one of the phytochemicals responsible for its reported antispasmodic effect (Allahverdiyev AN et al., 2004).

PHARMACOLOGICAL ACTIONS OF BADRANJBOYA (*MELISSA PARVIFLORA*)

- ♦ Kasire Riyah (Flatulence) (Lubhaya, 1984)
- ♦ Muffarah (Exhilarant) (Kabiruddin, 1955; Ibn Baitar, 1985; Ghani, 1921; Ibn Sina, 1927)
- ♦ Muffateh Sudad (Deobstruent) (Ghani, 1921; Ibn Sina, 1927)
- ♦ Muhallil (Resolvent) (Kabiruddin, 1955; Lubhaya, 1984)
- ♦ Mulattif (Demulscient) (Kabiruddin, 1955; Ibn Baitar, 1985; Ghani, 1921; Lubhaya, 1984)
- ♦ Munzije Sauda (Concoctive to Black bile) (Kabiruddin, 1955; Lubhaya, 1984)
- ♦ Muqawwi Dimagh (Brain tonic) (Ghani, 1921; Ibn Sina, 1927)
- ♦ Muqawwi Lissa (Gums strengthner) (Ghani, 1921; Ibn Sina, 1927; Ibn Baitar, 1985; Kabiruddin, 1951; Kirtikar and Basu, 1987)
- ♦ Muqawwi Meda (Stomachic) (Lubhaya, 1984; Ghani, 1921)
- ♦ Muqawwi Qalb (Cardiotonic) (Kabiruddin, 1955; Ibn Baitar, 1985; Ghani, 1921; Ibn Sina, 1927)
- ♦ Musafe Khoon (Blood purifier) (Kabiruddin, 1955; Lubhaya, 1984)
- ♦ Musakhin (Calorific) (Kabiruddin, 1955)
- ♦ Mushil (Purgative) (Ibn Baitar, 1985)
- ♦ Qabiz (Astringent) (Ibn Baitar, 1985; Aguirre-Hernandez, Rosas-Acevedo et al., 2007)
- ♦ Tiryaeq Sammom (Antidote) (Lubhaya, 1984)

THERAPEUTIC USES

- ♦ Alzheimer's disease (Kennedy, Wake et al, 2003)
- ♦ Amraze jild (Skin problems) (Rafiqueuddin, 1985)
- ♦ Safa (Baldness) (Grieve, Mrs.M. 1931)
- ♦ Bawaseer (Piles) (Ghani, 1921)
- ♦ Depression/Anxiety (Ghani, 1921; Lubhaya, 1984; Kabiruddin, 1951; Ibn Baitar, 1985, Lyle E. Craker, 2001; Perry and Perry 2006)
- ♦ Diqe Gidadi (Tuberculous glands) (Kirtikar and Basu, 1987)
- ♦ Duwaar (Vertigo) (Ibn Sina, 1927; Lawless, Julia, 1992)
- ♦ Falij (Paralysis) (Lubhaya, 1984; Kabiruddin, 1951)
- ♦ Fisharrud dam (Hypertension) (Lawless, Julia, 1992)
- ♦ Gashi (Syncope) (Ghani, 1921)
- ♦ Herpes Simplex (Thomas, et al. 2005)
- ♦ Hichhki (Hiccup) (Ibn Sina, 1927; Ibn Baitar, 1985; Kirtikar and Basu, 1987)
- ♦ HIV-1 (Thomas, et al. 2005]
- ♦ Humma (Fever) (Ibn Baitar, 1985; Lawless, Julia, 1992)
- ♦ Illate Haiz (Menstrual problems) (Ghani, 1921; Lawless, Julia, 1992)
- ♦ Influenza virus (Thomas, et al. 2005)

- ♦ Insect bites/ stings (Ibn Baitar, 1985; Bown, Deni. 2006)
- ♦ Insomnia (Saher) (Lubhaya, 1984; Ibn Sina, 1927; Ibne Baitar, 1985; Kabiruddin, 1951)
- ♦ Jarab(Scabies) (Kirtikar and Basu,1987; Nadkarni, 1989)
- ♦ Junoon (Insanity) (Ghani, 1921; Lubhaya, 1984; Ibn Baitar)
- ♦ Juzam (Leprosy) (Ghani, 1921; Kabiruddin, 1951)
- ♦ Khafqaan (Palpitation) (Lubhaya, 1984; Ibn Baitar, 1985; Kabiruddin, 1951; Ibn Sina, 1927)
- ♦ Khunaaq (Diphtheria) (Lubhaya, 1984; IbneBaitar, 1985)
- ♦ Laqwa (Facial palsy) (Lubhaya, 1984; Kabiruddin, 1951)
- ♦ Maar Gazeeda (Snake bite) (Ghani,1921; Lubhaya, 1984; Ibn Baitar, 1985)
- ♦ Mirgi (Epilepsy) (Lubhaya, 1984; Kabiruddin, 1951)
- ♦ Morning Sickness (Ghani,1921; David, 2003)
- ♦ Nafkhe Shikam (Flatulence) (Lubhaya, 1984; Ibn Baitar, Kabiruddin, 1951)
- ♦ Narfarsi (Eczema) (Lawless, Julia, 1992)
- ♦ Niqras (Gout) (Ghani,1921; Lubhaya, 1984; Ibn Baitar, 1985; Kabiruddin, 1951)
- ♦ Shaqeeqa (Migraine) (Kabiruddin, 1951; Ghani, 1921; Lawless, Julia, 1992)
- ♦ Suaal (Cough) (Lawless, Julia, 1992)
- ♦ Sue Hazam (Dyspepsia) (Ibn Sina, 1927; Ibn Baitar, 1985; Lyle E. Craker, 2001)
- ♦ Usre Tanafus (Asthma) (Ghani, 1921; Ibn Baitar, 1985; Kirtikar and Basu,1987; Lyle E. Craker, 2001)
- ♦ Wajaul Azlaat (Muscular pain) (Kirtikar and Basu,1987; Nadkarni, 1989)
- ♦ Waja-ul-Asnaan (Tooth ache) (Ibn Baitar, 1985)
- ♦ Warmepistan (Breast inflammation) (Kabiruddin, 1951)
- ♦ WarmeQooloon (Irritable Bowel Syndrome, Colitis) (Ghani, 1921; Rehaneh et al, 2006)
- ♦ WarmeShoeb (Bronchitis) (Ghani, 1921; Kirtikar and Basu, 1987; Nadkarni, 1989)
- ♦ Warme Shoeb (Bronchitis) (Lyle E. Craker, 2001)

PHARMACOLOGICAL STUDIES

1. Anti-depressant activity

In Elevated plus-maze experiment, intraperitoneal administration of rosmarinic acid in rats increased the number of entries in the open arms and produced anxiolytic-like activity (Pereira P et al., 2005).

2. Anti-oxidation activity

In vitro, analysis essential oil of Lemon balm exhibited strong free radical scavenging capacity and reduced the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical formation and OH radical generation; it also prevented lipid peroxidation (Allahverdiyev AN et al., 2004).

3. Effect on cholinergic receptor

In vitro, analysis shown that Lemon balm extract (MOE) modulated mood and cognitive performance in humans; higher dose showed longer duration of action than lower dose. The extract displaced [(3)H]-(N)-nicotine and [(3)H]-(N)-scopolamine from nicotinic and muscarinic receptors in the human cerebral cortex tissue with IC50 values of 0.18 and 3.47 mg/ml, respectively (Kennedy scholey., 2002).

4. Anti-spasmodic effects

Lemon balm essential oil and its main component, citral produced relaxation effects on KCl-, ACh- and 5-HT-induced contractions of rat isolated ileum with an IC50 value of approximately 20 ng/mL (Sadraei, Ghannadi et al., 2003).

5. Analgesic and sedative effects

Lyophilised hydroalcoholic extract of Lemon balm produced peripheral analgesic activity, reduced the acetic acid-induced pain (writhing test) and also potentialised the sleep induced by pentobarbital in mice (Soulimani, Fleurentin et al. 1991).

6. Anti-tumor activity

Essential oil of Lemon balm produced cytotoxicity against a series of human cancer cell lines (A549, MCF-7, Caco-2, HL-60, K562), and a mouse cell line (B16F10). Apoptosis in hematopoietic cancer cell lines was accompanied by DNA fragmentation and caspase-3 catalytic activity induction (Dudai, Weinstein et al. 2005).

7. Anti-microbial activity

Essential oil of Lemon balm produced antimicrobial activities against *Aspergillus niger*, *Listeria monocytogenes* type 4a, *Bacillus Subtilis*, *Bifidobacterium* sp., *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *Staphylococcus aureus*, *Candida albicans* and *Alternaria* sp. in vitro. Herbal water extract showed significant inhibitory effects against HIV-1 induced cytopathogenicity in MT-4 cells. Essential oil of Lemon balm also produced inhibitory activity against Herpes simplex virus type 2 (HSV-2) (Allahverdiyev, Duran et al. 2004).

CONCLUSION

The aim of the present review is to bestow a compendious information about the medicinal importance of badranjboya *Melissa parviflora*. It has been in use since times immemorial to treat the wide range of indications. Many experimental studies have confirmed its antioxidant, antispasmodic, antidepressant, antitumor, antimicrobial and analgesic activity. The scientific studies have proved most of the claims of traditional medicines. However, further, meticulous clinical research appears helpful to explore the full therapeutic potential of this plant in order to establish it as a standard drug.

DISCLOSURE STATEMENT

The authors declare that they have no conflicts of interest.

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CONFLICT OF INTEREST

The authors have no conflicting financial interests.

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