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***Lavandula stoechas* L: A systematic review of medicinal and molecular perspectives**

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ABSTRACT

Lavandula stoechas L. is a species of flowering plant in the family Lamiaceae, occurring naturally in countries. The aim of this study is to overview its therapeutic effects than its nutritive and industrial effects. This review article was carried out by searching studies in PubMed, Medline, Web of Science, and Iran Medex databases up to 2016. Totally, of 112 found articles, 40 articles (42 in vitro and 5 animal studies) were included. The search terms were “*Lavandula stoechas* L. ”, “therapeutic”, “pharmacological”, “traditional medicine”. Various studies have shown that *Lavandula stoechas* L. possess Anti-inflammatory properties, Biological activity, Anticonvulsant, sedative and antispasmodic activities, Pharmacological and Toxicological properties, Hepatoprotective and Reno protective. Hyperglycemia oxidative stress properties. *Lavandula stoechas* L. has various combinations and numerous medicinal properties, but still other herbal and medicinal properties of this plant are required to be identified.

Keywords: K. *Lavandula stoechas* L”, “therapeutic”, “pharmacological”, “traditional and complementary medicine

INTRODUCTION

It is proved that herbal medicine is effective in the treatment of many diseases [1-10]. *Lavandula stoechas* [French lavender, Spanish lavender, or topped lavender] is a species of flowering plant in the family Lamiaceae, occurring naturally in Mediterranean countries [11-15].

An evergreen shrub, it usually grows to 30–100 cm [12–39 in] tall and occasionally up to 2 m [7 ft] high in the subspecies *luisieri*. The leaves are 1–4 cm long, greyish and tomentose.

The flowers, which appear in late spring and early summer, are pink to purple, produced on spikes 2 cm long at the top of slender, leafless stems 10–30 cm [4–12 in] long; each flower is subtended by a bract 4–8 mm long. At the top of the spike are a number of much larger, sterile bracts [no flowers between them], 10–50 mm long and bright lavender purple [rarely white [16]].

This species is more fragile than common lavender [*Lavandula angustifolia*], as it is less winter hardy; but harsher and more resinous in its oils. Like other lavenders, it is associated with hot, dry, sunny conditions in alkaline soils. However, it tolerates a range of situations, though it may be short-lived. Selected forms are grown as ornamental plants. The cultivar ‘Willow Vale’ has gained the Royal Horticultural Society’s Award of Garden Merit [17].

L. stoechas is used commercially in air fresheners and insecticides. Flower spikes have been used internally for headaches, irritability, feverish colds and nausea, and externally for wounds, rheumatic pain and as an insect repellent [14, 18-33]. Since its introduction into Australia, it has become an invasive species, widely distributed within the continent. It has been declared a noxious weed in Victoria since 1920. It also is regarded as a weed in parts of Spain

Anti-inflammatory

The anti-inflammatory properties of *Lavandula dentate* and *Lavandula stoechas* extracts was tested in two inflammatory experimental models. *L. dentata* and *L. stoechas* extracts showed intestinal anti-inflammatory effect, confirming their potential use as herbal remedies in gastrointestinal disorders. In addition, their anti-inflammatory effect was also observed in other locations, thus suggesting a possible use for the treatment of the extra-intestinal symptoms of IBD [34].

The composition of essential oil of the leaves of *Lavandula stoechas* ssp. *stoechas*, was analyzed by means of capillary GC-MS. Results showed that the main components of *L. stoechas* ssp. *stoechas* oil were pulegone (40.4%), menthol (18.1%), and menthone (12.6%). The essential oil of the plant was evaluated for antibacterial and a panel cytotoxic activities [35].

comprehensive assessment of the composition and biological activities of the essential oils (EOs) extracted from the aerial flowering parts of wild growing *Lavandula stoechas* L. collected from eleven different locations in northern Algeria was performed. The eleven EOs exhibited good antimicrobial activities against most of the 16 tested strains of bacteria, filamentous fungi, and yeasts, with minimum inhibitory concentrations (MICs) ranging from 0.16 to 11.90 mg/ml [36].

Anticonvulsant, sedative and antispasmodic activities

The aqueous-methanolic extract of *L. stoechas* flowers (LS) was studied for its possible anticonvulsant and antispasmodic activities. These data indicate that the plant extract exhibits anticonvulsant and antispasmodic activities. Its calcium channel blocking property may be mechanistically related to these activities. Its usefulness in folk medicine appears thus to be based on a sound mechanistic background [37].

The chemical and pharmacological properties of the essential oil of *Lavandula stoechas* subsp. *Luisieri* was evaluated. It revealed important antioxidant activity with a high ability to inhibit lipid peroxidation and showed an outstanding effect against a wide spectrum of microorganisms, such as gram-positive and gram-negative bacteria and pathogenic yeasts. The analgesic effect studied in rats was dose dependent, reaching a maximum of 67% at 60 min with the dose of 200 mg/kg and the anti-inflammatory activity with this dose caused an inhibition in carrageenan-induced rat paw oedema (83%) that is higher than dexamethasone 1 mg/Kg (69%). [38].

Hepatoprotective and Reno protective

The hepato- and nephroprotective effects of *Lavandula stoechas* essential oils (LSEO) against malathion-induced oxidative stress in young male mice as well as the possible mechanism implicated in such protection was investigated. LSEO treatment abolished all malathion-induced body gain loss, liver and kidney relative weight increase, hemodynamic and metabolic disorders, as well as hepatic and renal oxidative stress. LSEO exerted potential hepato- and nephroprotective effects against malathion-induced oxidative stress in mice. The beneficial effect of LSEO might be related, in part, to its antioxidant properties [39].

Hyperglycemia oxidative stress

The phytochemical profile of *Lavandula stoechas* essential oils, collected in the area of Ain-Draham (North-West of Tunisia), as well as their protective effects against alloxan-induced diabetes and oxidative stress in rat was described. The findings suggested that *Lavandula stoechas* essential oils protected against diabetes and oxidative stress induced by alloxan treatment. These effects are in partly due to its potent antioxidant properties [40].

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