~~*Khuzāma (*~~*Lavandula angustifolia* Mill.~~)~~: Pharmacological Action and Therapeutic uses in perspective of Unani Medicine- a Review

ABSTRACT

Lavender is a ~~very~~ popular and~~a~~ very effective medicinal herb used in Unani Medicine. Its aerial parts~~,~~ , leaves and flowers are used to treat various ailments and also as additive in several cosmetic products. Essential oil present in the plant is believed to have sedative, carminative, anti-depressive, anti-inflammatory and antimicrobial properties. The pharmacological activities hence may be due to the presence of bioactive compounds like, betulin, betulinic acid, lactone and 3 beta-formyl ursolic acid, essential oil, glycolic acid, valeric acid and linalyl acetate etc. in the plant. This review gives detailed information regarding the identification, action, uses and scientific researches etc. regarding the *Lavandula angustifolia* Mill.

Comment [DB1]: The author is expected to add a background to the study, also give a brief introduction to the aim and objectives of the study. Kindly refer to the journal format showing brief sub-heads: (Background, materials and methods, results, conclusion)

Keywords: Lavender;*Lavandula angustifolia* Mill.;*Khuzāma*; Aroma Therapy; deodorant.

1. INTRODUCTION

Many fragrant and therapeutic plants are found in the *Lamiaceae* family. Lavandula is one of the important Genus which includes thirty species, dozens of subspecies, hundreds of hybrids, and selected cultivars. Four species of this genus are widely used in the cosmetic, perfume, and pharmaceutical industries, namely (1) *Lavandula angustifolia* Mill., commonly known as English lavender (formerly known as *Lavandula vera* or *Lavandula officinalis* Chaix or true lavender); (2) *Lavandula latifolia* Medik., a Mediterranean grass-like lavender; (3) *Lavandula stoechas* L., which has a very strong odour, sometimes known as French lavender; and (4) *Lavandula x intermedia* Emeric ex Loisel., which is a sterile cross between *Lavandula latifolia* and *Lavandula angustifolia* [1]. In Unani System of Medicine, three species of lavender are therapeutically used namely: 1) *Ustukhuddus* (*Lavandula stoechas* L.) also known as French Lavender [2,3], 2) *Khuzāma* (*Lavandula angustifolia* Mill., *Lavandula officinalis* Chaix, *Lavandula vera* DC) often known as therapeutic lavender, true lavender, or common lavender, 3) *Lavandula latifolia* also known as Spiked lavender [3]. The name Lavender is derived from the Latin word “lavo”, or “lavare” which means to wash or clean. According to Dioscorides in "*De Materia Medica*," which extols lavender's medicinal virtues, it has been recognized since ancient times. Lavender was used as a bath additive by the Romans, and in the middle Ages, it was one of the most expensive essential oil plants used to make perfume and soap. Lavender is a fragrant shrub that can reach height up to 1-2 meters which blossoms in false whorls, blue, spreading above the foliage. [4,5,6]. The active ingredients found in herbs have multifaceted Phyto-therapeutic activity and are used to treat gastrointestinal, cardiovascular, pulmonary, and urinary infections in children and the elderly, as well as chronic disorders [4]. *Lavandula angustifolia* essential oil has antinociceptive, immunomodulatory and anti-inflammatory properties [7]. According to

Dioscorides in "*De Materia Medica*," which extols lavender's medicinal virtues, it has been recognized since ancient times. [4] *Ibn-i-Sina* and *Razi* also prescribed lavender for treatment of epilepsy and migraine attacks. Furthermore, lavender is considered beneficial in treatment of pain and tumor [8]. The *Khuzāma* (*Lavandula angustifolia* Mill.) species is well known as important aromatic and medicinal herb that is used in Unani and other traditional and folk medicines for its importance in the treatment of several bodily ailments.

Lavender has a lot of volatile oils, which have both a fragrant and therapeutic impact. The linen bags containing lavender flowers were frequently placed beneath the pillow because of the alleged soporific qualities of lavender. Linalool, Perilya alcohol, linalyl acetate, camphor, limonene, tannins, triterpenes, cineole, and flavonoids are only a few of the more than 100 components found in lavender herb. Also possessing cytotoxic qualities is the lavender plant. The skin easily absorbs lavender oil. Another use for lavender is as a healing agent. Lavender is also used as herbal tea [5].

The author is expected to describe or give brief information about Unani medicine.

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2. MATERIAL AND METHODS

A comprehensive literature review was conducted by searching all available classical textbooks using key terms such Khuzāma and Ustukhuddus, in the context of Unani medicine. Additionally, electronic databases including Research Gate, Google Scholar, and PubMed were explored using keywords like Lavender,*Lavandula angustifolia* Mill., *Khuzāma*, Aroma Therapy, deodorant, Ustukhuddus, Unani Medicine etc. The search included both classical Unani terms and botanical nomenclature. Review articles and experimental studies were carefully considered for data collection and subsequent analysis. This meticulous approach aimed to gather relevant information from both traditional Unani sources and contemporary scientific literature, providing a comprehensive overview of the therapeutic applications and properties associated with *Lavandula angustifolia* Mill., in the context of Unani medicine.

3. Observations

Distribution

Khuzāma (*L. angustifolia*) is grown in Mediterranean region in Java and in Mountain regions locally as an ornamental, but it is extensively cultivated in Southern France, widely grown in country gardens and now it has become naturalized in some warm parts of Europe, but not in the British Isles. Lavender is also cultivated on a large scale for its oil, most of which is contained in special glands. Attempts have been made to cultivate lavender in India. Cultivation on an experimental basis has been under taken at several places in Kashmir namely Baramulla, Chattarnar, Yarikha, Gandarbal and Srinagar and the results are promising [8,10].They are widely grown in various countries, particularly Bulgaria, Spain, Ukraine, China, France, Australia, Morocco and the United Kingdom also[1].

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Botanical description of what?:

It is an ~~An~~ evergreen subshrub with a much-branched woody stem, the square green shoots are thickly covered with evergreen, stalk-less, oblong-lanceolate, entire, linear 2–6 cm long and 4-6 mm wide leaves, which at first are white-felted, later green. The small, bluish, two-lipped flowers are arranged in spike-like terminal panicles often interrupted below. All parts of the plant are aromatic. ~~f~~Flowers-in-vertices, emerging from the axil of a rhomboidal bract, Individual blooms up to 5 mm long, 1 to 2 mm wide, bluish-violet to pale brown in colour, Calyx tubular, ribbed, fine toothed, pubescent, shiny oil glands visible among the hairs,

corolla purple grey, tubular, two lipped, posterior lip has two lobes, and anterior lip has three lobes. The hairy corolla has four stamens that stick out, and there are occasionally dark green leaf pieces that are up to 2 cm long and 2 to 3 mm in diameter. The midrib is oblate-linear and noticeable on the underside. The petals are bluish white with a yellowish tinge on occasion. The sepals have 5 to 8 mm range in length. The plant has camphorous perfume, and the taste is pungent at first but bitter later on. The fruit consists of four nutlets[4,5,6,8,10,11].

Fig 1. *Khuzāma* (*Lavandula angustifolia*) plant a., leaves b., flowers c. & d.

Microscopy of what?:

In microscopy calyx fragments and greyish-blue powder of flowers were observed. The elongated epidermal cells that cover trichomes have wavy anticlinal walls, multicellular, branching, and frequently form a dense mat. Labiate glands, corolla fragments, nearly oval, wavy-walled epidermal cells, covering trichomes, glandular trichomes, unicellular stalks, papillose, and ending in a single celled glandular head make up the encapsulated labiate oil glands. Pollen grains, ellipsoidal leaf fragments, straight, walled epidermal cells, branched trichomes, glandular trichomes on the labiate oil glands, and slender fibers [11].

The cross sections of the sepal shows the inner epidermis, the cells of which are radially as well as tangentially elongated. The inner epidermal cells are devoid of trichomes. In surface view, these are polygonal with sinuous walls. The outer epidermal cells are indistinct due to heavy growth of glandular as well as non-glandular hairs. The non-glandular hairs are multicellular, branched, or tufted with more or less attenuated ends. Glandular trichomes are mostly of two types; one mostly with single or double celled tail and single celled head and the other tailless with multicellular head. Stomata are typical labiatous type. The mesophyll is undifferentiated; the parenchymatous tissues are mostly tangentially elongated. The vascular bundle is of collateral type [8].

Scientific classification

Kingdom	:	*Plantae*
Division	:	*Tracheophyta*
Order	:	*Lamiales*
Family	:	*Lamiaceae*
Genus	:	*Lavandula* L.
Species	:	*Lavandula angustifolia* Mill.
Synonyms	:	*Lavandula officinalis* Chaix, *Lavandula spica* L. and *Lavandula vera* DC.

Cultivation and Collection:

Khuzāma (*Lavandula angustifolia*) grows in garden and sandy soils [3]; it thrives with little water and is well known for its vibrant floral aroma. In moist soil, it won't grow. The herb has several health-promoting qualities for people[4]. *It* developed from seeds are propagated via cutting or division. After a year, cuttings are planted in nursery beds and moved to the field. After three years, they are ready for harvesting. Rabi crops are typically planted in October-November and harvested in March-April. If the blooms are needed separately, the tops are picked just before the flowers fully open. They are knotted into little bundles and hung in the shade, head down, to dry. The dried blooms are then removed from the stalk by hand. [8,12]

Description in Unani Literature:

In Unani literature it is mentioned that the flowers of Khuzāma are similar to *Banafsha* (*Violet odorata*) and with a somewhat sky-blue and blue color, it smells like *Gul-i-Sayuti*/*Gul-i-Chandni*(Crape jasmine-*Tabernaemontana divaricata*) or *Gul-i-Hina* (*Lawsonia inermis*); seeds are black. It is also called *Khīri al-Bar*, its stem is long, and leaves are small. [3,13] Only flowers are used medicinally because of its high quantity of essential oils. Another species is spike lavender or *Lavandula latifolia* which produces fragrant oil, known as Spike lavender oil or Sumbul oil. Mainly flowers, essential oil and tincture are used for colour and fragrance but also used for the treatment of various ailments [3].

***Mizāj* (temperament):**

Its temperament is hot in 1st and dry in 2nd degree. [8]

***Af'ālwaKhawās* (actions and uses):**

Lavandula angustifolia is used for *Mulattif* (demulcent), *Musakhkhin* (calorific), *Muqawwī-i-Dimāgh* (brain tonic), *Mufattih-i-Sudad* (deobstruent), *Sudā'* (headache), *Muḥallil-i-Riyāh* (anti-flatulent), *Muqawwī-i-Jigar* (liver tonic), *Muqawwī-i-Qalb* (heart tonic), *Muqawwī-i-Tihāl* (spleen tonic), *Mujaffif* (siccative), *Muqawwī-i-A'sāb* (nerve tonic), *Muqawwī-i-Mi'da wa Am'ā* (stomachic and intestine tonic), *Dafi-i-Nazla* (anti-catarrh), *Ḍu'fī-Qalb* (weakness of heart), *Ḍu'fī-Dimāgh* (weakness of brain), *Ḍu'fī-A'sāb* (nerve weakness), *Ḍu'fī-Jigar* (hepatargia), *Qūlanj* (colic), *Ḍu'f-ī-Mi'dā* (weakness of stomach), *Kāsir-i-reyāh* (carminative), *Dāfi'-Tashannuj* (spasmolytic), *Musakkin-i-Alam* (analgesic), *Mukhaddir* (anesthetic), *Dāfi'-i-*

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'Ufūnat(Antiseptic), (Anticonvulsant), *Hādim* (digestive), *Mudirr-i-Bawl* (Diuretic), *Muḥarrik* (Stimulant) activities[3,8,14,15]. Its essential oil has carminative, antispasmodic, anticonvulsant properties and used for the treatment of Flatulence, Colitis, Hysteria and Nerve diseases. [3]

***Tarkīb-i-Iste'māl* (method of administration)**

- A *Dhūni* (fumigation) of *Gul-i-Khuzāma* (flowers of *Lavandula angustifolia*) is useful in infectious diseases. [15]
- Local application of paste of *Gul-i-Khuzāma* prepared along *Arad-i-Jaw* (flour of barley) is beneficial for wound healing, it resolves inflammation also. [14,15]
- It is used as vaginal suppository for abortion and expulsion of morbid matter from uterus. [15]
- Taking *Khuzāma* 10.5 g orally is helpful to expels aberrant matter through urine from the body. [14]
- *Ṭilā* (liniment) of dry *Khuzāma* is used to provide strength to male genitals; it can also be used as deodorant for giving fragrance to body. [3,14]
- Its oil is similar to *Nifṭ*(kerosene) [3,14]

Comment [DB7]: The author is expected to indicate the methods of administration and doses as the sub-topic of the section depicts.

***Maḍarrat* (toxicity, side effect and adverse effect):**

It produces harmful effect on hot tempered people and causes headache. [3,14]

***Musleh* (Corrective):**

Katīra (*Sterculia urens*), Gogul (*Commiphora mukul* Hook ex Stocks) and Sikanjabīn (*Vinegar* and *honey*). [8]*Āsal*(honey), *Mūrad* (*Myrtus communis*) are the correctives to counter its adverse or harmful effects of what?[3,14]

***Badal* (Substitute or Alternative) to what?:**

Aftīmūn (*Cuscuta europaea* Linn.), Bādranjboya (*Melissa officinalis*), *Akāshbel* (*Cuscuta reflexa* Roxb), *Farāsiyūn*[8] and *Babūna* (*Matricaria chamomilla* L.) [3,14]

***Miqdār Khūrāk* (Dosage):** Several doses are mentioned as follows:

- 3 to 7 g [8]
- 10.5 g [3,14]
- 5 to 7 g [15]

Compoundformulations: *Roghan-i-Sumbul* or Spiked Lavender oil is the essential oil obtained from spiked lavender (*Lavandula latifolia*). *Arq-i-Khuzāma* (lavender water) is used for inhalation and also used as additive in various lotions and ointments [3].

Phytoconstituents:

Steam distillation is used to extract lavender oil from flowers and flowering tops. Linalyl acetate is the main ingredient of lavender oil in English oil. Linalool, geraniol and its esters, lavendulol, nesol, cineole, and other components are also present in the oil. [8]The *Lavandula angustifolia* aerial parts include betulin, betulinic acid, lactone and 3 beta-formyl ursolic acid, essential oil, glycolic acid, valeric acid, borneol, camphor, lavandulyl, caryophyllene, terpene-4-ol, alpha-terpineol, ursolic acid, herniarin, anthocyanins, phytosterols, sugars, minerals, coumaric acid, coumarin and tannins [4,12].

Pharmacological Studies

Sedative and hypnotic Activity:

According to the study done by Zhong Y (2019), the essential oil Anshen obtained from *L. angustifolia* Mill. has been found to have sedative and hypnotic actions that can dramatically lower autonomic activity, lengthen sleep duration and shorten sleep latency, as well as enhance 5-HT and GABA levels in the brain. Compound Anshen essential oil contains a variety of chemical compounds that have sedative and hypnotic effects on the nervous system, as well as anti-anxiety and anti-depressive effects [16].

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Anti-Proliferative and Apoptotic Activity:

Simsek A et al. (2021) demonstrated that low concentrations of lavender extract in the synthesis of silver nanoparticles (La-AgNPs) are cytotoxic to cancer cells. These findings suggested a possible role for La-AgNPs as a Glioblastoma multiforme treatment therapeutic agent. In this study, the anti-proliferative and apoptotic inducing properties of these nanoparticles in the U87MG glioblastoma cancer cell line, as well as the green manufacture of silver nanoparticles (AgNPs) utilizing*Lavandula angustifolia* extract were done [17].

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Antiemetic Activity:

A new understanding for thoroughly clarifying the antiemetic effect of *Lavandula angustifolia* Mill. essential oil (LEO) was given by the results of network pharmacology and mechanism verification based on weight coefficient. LEO specifically decreased the amount of 5-HT and blocked its associated receptors. The antiemetic effect of LEO on CINV may therefore be mediated through modulating the downstream Ca^{2+}/CaMKII/ERK1/2 pathway of the cAMP signaling cascade. This study supported the idea that olfactory therapies could be used to treatchemotherapy-induced nausea and vomiting. [18]

Antimicrobial Activity:

The *in-vitro* antibacterial activity of *Lavandula angustifolia* Mill. (Lavender) essential oil combined with four marketed antimicrobial agents is the main topic of the research. Stock solutions of ciprofloxacin, nystatin, fusidic acid, and chloramphenicol were evaluated in conjunction with *Lavandula angustifolia* essential oil. *Staphylococcus aureus*, gram-positive bacteria and *Pseudomonas aeruginosa,* a gram-negative bacterium, were used to test the antibacterial properties of the combinations. *Candida albicans* was used to represent yeasts. The minimum inhibitory concentration microdilution assay was used to measure the antibacterial action. When *Lavandula angustifolia* essential oil and chloramphenicol were mixed and evaluated against the pathogen *P. aeruginosa*, the strongest interaction was observed. When used in ratios where higher volumes of *Lavandula angustifolia* essential oil were included in the combination, it was shown that *Lavandula angustifolia* essential oil interacted synergistically in the majority of cases with conventional antimicrobials. [19]

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Anti-Toxoplasma Activity:

In this study, the anti-Toxoplasma gondii activity of 16 essential oils (Eos) was tested. On *Toxoplasma gondii*, it was discovered that *Lavandula angustifolia* essential oil (La EO) had an anti-parasitic effect. Human foreskin fibroblast (HFF) cells were used to assess the cytotoxicity of Lavandula essential oil (La EO) first, and subsequently plaque assay was used to assess the anti-*Toxoplasma gondii* activity. Finally, the mechanism of La EO's anti-toxoplasma activity was investigated using the invasion experiment and electron microscope observation. The findings showed that La EO's cytotoxic concentrations (CC_{50}) was 4.48 mg/ml, that it had efficacy against *Toxoplasma gondii*, and that the inhibition occurred under safe concentrations in a dose-dependent manner. La EO was successful in reducing *Toxoplasma gondii* invasion, which may be related to its negative impact on tachyzoite

morphological changes. These results suggested that La EO might have therapeutic potential for toxoplasmosis [20].

Anti-leishmanial Activity:

The nano-emulsions of both *L. angustifolia* and *Rosmarinus officinalis* were more effective than essential oil in both mean infected macrophages (MIR) and amastigote. In both MIR and amastigote, the nano-emulsions of both plants were more efficient than the essential oils. Lavender essential oil is more efficient for reducing MIR than meglumine antimoniate (MA), though. At a dosage of 0.25 l/mL, rosemary nano-emulsion dramatically decreased MIR more than MA ($P<0.001$)[21].

Antifungal Activity:

Linalool and linalyl acetate are expected as the two main ingredients of *Lavandula angustifolia* Essential oil (LAEO). According to study done by Mijatovic S et al., (2022) LAEO was found effective in preventing *Candida albicans* sputum isolates from growing. The principal fungistatic effect of LAEO's 2% solutions occurs within 30 minutes and is powerful and quick. Both fluconazole susceptible and fluconazole resistant isolates, as well as wild-type (WT) and non-WT caspofungin isolates, respond to the same concentration. Despite the fact that systemic antifungal medications are the foundation of the preventative treatment of invasive candidiasis, further research is required to judge the efficacy of using essential oils as aromatherapy with high-risk patients [22].

4. CONCLUSION

In conclusion, Khuzāma (Lavandula angustifolia) emerges as a promising aromatic herb in Unani Medicine, with its fragrant oil being a key focus of cultivation. The lack of Unani-based studies highlights a research gap that needs to be addressed to fully understand and utilize the plant's medicinal benefits. This review aims to provide a foundation for future research endeavors, offering basic information to the scientific community and encouraging further exploration of Khuzāma's potential in Unani Medicine.

CONSENT (WHEREEVER APPLICABLE)

Not applicable

ETHICAL APPROVAL (WHEREEVER APPLICABLE)

Not applicable

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Comment [DB10]: Author is encouraged to add DOI of all reference cited.

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