"Laurus nobilis" L., (Habb-ul-Ghar), A Review on Phytochemistry, Pharmacology and Ethnomedicinal Uses

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Abstract

Habb-ul-Ghar ("Laurus nobilis" L., fruit) is used in the Unani and other traditional systems of medicine since ancient times. It has been also used in culinary and pharmaceutical industries. Various phytoconstituents were isolated from laurel fruit, like monoterpenes, sesquiterpenes, fatty acids, flavonoids, phenolic acid, and some minerals. Many pharmaceutical studies have been carried out to explore its anti-oxidant, antimicrobial, anti-proliferative, anti-inflammatory activities. This review will provide a comprehensive overview only about fruit of "Laurus nobilis" with special reference to Unani medicine.

Keywords: Habb-ul-Ghar; Laurus nobilis; Laurel fruit; Unani medicine

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INTRODUCTION

As the name implies, the Unani system of medicine has its roots in ancient Greece and has been further refined by Roman, Arabic, Spanish, Iranian, and Indian physicians. As a result, Greco-Arab Medicine was born. It is a holistic medical system that systematically addresses various health and illness conditions. It involves healthcare that is preventive, curative, and rehabilitative. According to the Unani concept, the human body comprises seven basic components: element, temperament, humour, organ, pneuma, faculties, and functions. The mere absence of any components directly impacts life's very existence, and its imbalance leads to disease. The Medicatrix Naturae ("Tabī'at mudabbīra-i-badān"), according to the Unani system of medicine, is the supreme power that regulates all physiological functions of the body, gives resistance to diseases, and promotes natural healing. The system's foundations, diagnostic, and treatment techniques are based on scientific principles and holistic health and healing theories. Rather than taking a reductionist view of sickness, it uses a holistic approach that considers the entire individual.

"Laurus nobilis" L., commonly known as laurel or sweet bay, is a perennial shrub or tree, a native of the Mediterranean countries, widespread in temperate and warm regions. In Unani system of medicine, its fruit is used with the name of "Habb-ul-Ghar". Fareed Ahmad Abbasi mentioned in "Sadila Al-Jameela that Asqaliboos Awwal" (Asklepiades, 1st Century) has started preparation of "Tiryaq" (antidote) from single ingredient Habb-ul-Ghar. Later, Unani physician "Indru Makhiz" added four ingredients and give the name "Tiryaq Arba". The popularity of "Tiryaq Arba" is growing in the current epidemic situation, where it can be used as a preventative medicine. It is widely cultivated in Europe, America, Western Asia, Northern Africa, Arabian countries, and India. The essential oil can be extracted from the plant leaves and fruits, while fixed oil derived mainly from the berries. Bay laurel essential oil has been discovered to have a variety of remarkable qualities that have a wide range of potential applications in various fields, including seafood, meat preservation, veterinary, and cosmetics, as well as health. The usage of laurel in cuisines has become more widespread in recent years, with its notably fragrant leaves and berries being used in various culinary preparations. Moreover, the fruits and leaves of "L. nobilis" have been used in traditional medicine for rheumatism, dermatitis, viral infections, antiseptic, hysteria, emmenagogue, diuretic, general gastric secretion stimulant, carminative, diarrhoea, and antidote in snake bites since antiquity."
MATERIAL AND METHODS

Habb-ul-ghar was explored in classical Unani literature for its temperament (mizzaj), medicinal properties and therapeutic uses. Urdu translation of the classical books such as Al Jami ul Mufradat Al Advia Wal Aghzia of Ibn al Baitar (1197-1248 AD), Muheet Azam of Hakeem Mohammad Azam Khan (1806-1902 AD), Khazainul Advia of Najmul Ghani, (19th century), Al Mukhtarat fit Tib of Ibn Hulbi Baghdadi (1122 -1213 AD), and Tazikra Oolul albAb (Arabic) of Dawud al Antaki (1541-1599 AD), Tuhfat ul Momineen (Persian) of Momin Tonekabi (1669 AD), etc., were conferred. Published works available on PubMed, Science Direct, and Google Scholar were referred to collect all the available information regarding its phytochemicals and pharmacological studies. Standard Unani Medical Terminology published by Central Council for Research in Unani Medicine in collaboration with the World Health Organization was used to describe the appropriate Unani terminologies.

DESCRIPTION OF HABB-UL-GHAR IN UNANI LITERATURE

Table 1: Common name in a different region

| Region / Language | Common name |
|-------------------|-------------|
| Arabic            | Ghar<sup>3</sup> |
| English           | Sweet bay laurel, Victor’s laurel<sup>13</sup> |
| France            | Apollo’s laurel, Laurier D Apollon<sup>14</sup> |
| India             | Hab-el-ghar<sup>13</sup> |
| Iran/Persian      | Barg Boo, Laurel tree, sweet bay<sup>14</sup>, Bahlshtan<sup>3,15</sup> |
| Italy             | Alauro, Lauriello, Lobererfrucht<sup>14</sup> |
| Japan             | Gelkejeui, Bay laurel<sup>15</sup> |
| Morocco           | Habbet ul Ghar, Asat Sind Musa<sup>14</sup> |
| Tunisia           | Laurier sauce, Rend<sup>14</sup> |
| Unani             | Daphni<sup>15</sup> |

Morphology (Māhiyat): Habb-ul-ghar is the fruit of a large tree that lives long nearly one thousand years.<sup>16,17</sup> It is smaller than Funduq (fruit of Sapindus trifoliatus) but similar to the fruit of Neem (Melia azedarach). Leaves resemble Barg Aas (leaves of Myrtus communis), giving a particular fragrance on mashing like Badam Talkh (Prunus amygdalus)<sup>3,18</sup>. The peel of the fruit is off-white blackish but very thin and fragile. Fruit divide into two parts on rubbing between two fingers. The seeds are hard, shiny, smooth surface, orange in colour, and possess a slight fragrance.<sup>3,19</sup> The fruits are bitter but fragrant<sup>20,21</sup>. Berries and bark are used alone or as an ingredient of compound formulations in the Unani system of medicine. It is mainly found in Asia Minor and Europe. In India, it was tried to be cultivated on Nilgiris hills but unable to grow properly, so it is imported from abroad<sup>22</sup>.

Parts used (Hasas-i-Musta’mla): In Unani system of medicine mostly fruits and essential oil are used<sup>3,16,19-21</sup>, but leaves and other parts are used in other traditional systems of medicine<sup>6,13,14,24</sup>.

Temperament (Mizzaj): The temperament of drugs has remained key to the theory of drug action in the Unani system of medicine, and it is one of the basic fundamental concepts. The temperament of a person and the drug’s temperament serves as a conceptual framework for adequately using the medicine, predicting its effect on the body, and serving as an indicator of drug potency. Unani physicians have divided the drugs into four categories (hot, cold, wet, and dry) in terms of their effect on a moderate human body. The temperament of Habb-ul-Ghar is hot and dry in the second degree<sup>18,21,22</sup>. Hot and Dry in third-degree<sup>17,26</sup>.

Action and uses (Af’al aur Mawāq-i-istemāl):

It has several pharmacological properties such as Musabill-i-awrām (resolvent: a substance that dissolves thick and viscous humour, hence reducing inflammation and swelling), Musakkin-i-alam (analgesic: an agent which relieves the pain), Muḥarrir-i-āzāb (nerve stimulant: an agent which stimulates the nerves), Muṣfarīḥ (refrigerant: a drug that reduces tachycardia, palpitation of heart and thirst), Muqawwī (tonics: a non-toxic natural substance that tone up the internal organs and improve the body functions), Musakkin (sedative: a substance which helps in neutralizing the heat of humour), Muqawwī-i-Mī’ād (stomachic: an agent which strengthens the sexual organs and boosts the libido), Kasir-i-iyyāh (carminative: a substance that promotes to release gases from the gastrointestinal tract)<sup>17,18,21,23</sup>.

- Habb-ul-gar is an important antidote for all poisons and is used internally or externally with wine for snake bites, scorpions, and other insect bites<sup>3,19,22,23</sup>.
- Habb-ul-ghar used alone or in conjunction with honey is effective in phlegmonic headache, flatulence, epilepsy, duodenal ulcer, and strengthens Qawwat hāfīza (faculty of memory)<sup>3,19-21</sup>.
- 9 g powdered Habb-ul-ghar when ingested orally found effective in numbness, paralysis, and facial palsy<sup>3,19,20</sup>.
- When used as ear drops, the ground Habb-ul-ghar in Roghan Gul or vinegar relieves tinnitus, deafness, and otalgia<sup>3,16,19,21</sup>.

Gargling with the decoction of Habb-ul-ghar relieves toothache<sup>16,22</sup>.

- Habb-ul-ghar as linctus, mixed with honey and taken orally, is effectively used in dyspnoea, lung ulcer, chronic cough, and phlegmonic disease of the chest<sup>4,19,20,23</sup>.
- Habb-ul-ghar 7 g taken with Sikanjabin or honey expel viscous humours and act as purgative<sup>19,20,23</sup>. Moreover, it dissipates the viscous gases and is also helpful in Maghs (teneusmus), Qulān (colic), liver and spleen disorder. In another regimen, 9 g Habb-ul-ghar powder taken with the mucilage of Isaghol gives instant relief in intestinal colic<sup>5,20,22</sup>.
- 4.5-9 g Habb-ul-ghar mixed with wine when given orally relieves incontinence and dribbling of micturition, helps in parturition, and also acts as an emmenagogue<sup>3,18,19,23</sup>.
- 3.5 g of Habb-ul-ghar, when taken orally with water, shows a lithotriptic effect<sup>16,19,23</sup>.

In conjunction with Sikanjabeen (a liquid preparation made with vinegar and honey/sugar), Habb-ul-gar was found effective in a disease of hot temperament and, when taken with honey, gives a beneficial result in conditions of cold temperament, as advised by Dawud Antaki. He also advised to use as Natul (irrigation) for resolvent; Ābzn (sitz bath) for rectal and uterine diseases; Firzoja (pessary) for abortion and diuretics<sup>20</sup>.

Roghān (oil) of Habb-ul-ghar used tropically in Dā’al-thā’lab (alopecia areata), Qāhā (ringworm), Qāṭāl-i-qamī (kills the lice), Wajā’ al-Mafṣīs (polyarthritis), Naiqār (gout), Wajā’ al-Zahr (backache), Jarab wa Hikka (scabies
and pruritis, Fālīj (hemiplegia), Laqwa (facial palsy), Waja’ al-kabid (hepatic pain), Waja’ al-âsâb (neuralgia), strengthening of muscle and found very effective. It is concoctive to Awwram balghamiya (phlegmatic inflammation) and Mahbûllî-ī riyaḥ (resolve flatus).27.

**Dose (Miqdār-i khorāk):** The dose of Habb-ul-ghar is 2-3 gm and up to 9 gm for purgation purposes3,17,19.

**Adverse effects (Muzir):** According to Ibn Sina, Habb-ul-ghar induces Qay‘ (vomiting); muscle and ligament of the stomach become flaccid i.e. Istirkha‘ al-mī‘da (gastroptosis).3,19,22. It is also harmful to the liver17,26.

**Correctives (Musleḥ):** Zarishk (Berberis vulgaris),3,17,19; Katîra (Sterculia urens);21 Tabasheer (Bambusa arundinacea)26.

**Substitute (Badal):** Haab-ul-Mahlab (Prunus mahaleb), Badam Talkh (Prunus amygdalus);19 Shooneez (Nigella sativa)17,26; Sazaj (Cinnamomum tamale)20

### Unani formulation

#### Table 2: Showing compound formulations of Habb-ul-ghar, dosage and indications

| Name of Compound formulation and their forms | Dose and methods of administration/application | Indications |
|---------------------------------------------|-------------------------------------------------|-------------|
| Tiryaq-i-arbâ (Majun form)                   | 2-4.5 g, orally with lukewarm water              | Epilepsy, paralysis, palpitation, intestinal colic obstruction, anti-flatulent, antidote against poison, abortificient, cardiac and brain tonic20 |
| Tiryaq-i-fâraq (Majun form)                  | 1 g with Khamerea gaqzanam ambâri or Dawa wul misk/ orally | Hemiplegia, facial palsy, tremor, epilepsy29 |
| Tiryaq-i-samâniya (Majun form)               | 5 g, orally with Arq Badiyan or water            | Hemiplegia, facial palsy, tremor, epilepsy, anti-flatulent, intestinal obstruction29 |
| Tiryaq-ut-tîn (Majun form)                   | 2-3 g, orally with water at morning              | Opium poisoning, antidote to scorpion bite30 |
| Tiryaq-i-aqrab (Majun form)                  | 3-5 g                                           | Scorpion bite, intestinal colic, gastralgia, visceral pain30 |
| Anqariya-e-kabeer (Majun form)               | 4 g, orally with milk at night                   | Hemiplegia, epilepsy, facial palsy, amnesia, gout, asthma, aphrodisiac, digestive tonic29 |
| Dawa-ul-kibrit (Majun form)                  | 5g, orally                                      | Nerve weakness, stomach weakness30 |

**Habb-ul-Ghar (Laurel fruit) in other Traditional medicine**

In Iran, a decoction of dried fruit is taken orally as an appetite stimulant & digestive aid. In Israel, fruit essential oil is used externally on wounds, rheumatic & neuralgic pain. The dried fruit in hot water extract orally as a circulatory medicine extract of the L. nobilis fruits has been used in Turkish folk medicine as an anti-hemorrhoidal, antiurheumatic, antidote in snakebites, and stomach ache13.

**DESCRIPTION OF HABB-UL-GHAR IN THE SCIENTIFIC LITERATURE**

**Taxonomical classification:** kingdom: Plantae; Division: Magnoliopsida; Order: Laurels; Family: Lauraceae; Genus: Laurus; Species: nobilis31.

**Plant description:** Laurus nobilis L. is a profusely branched shrub or a small size tree, usually grow up to height of 10 meters.
The surface is glabrous shining and the epidermis. The oil is deposited, calcium, sodium, potassium, and iron, viz. phenolics, steroids, glycoside, fixed and essential oil, tannins, resins, flavonoids, carbohydrates, proteins and iron, calcium, sodium, potassium, etc. phosphate as inorganic compounds.

**Microscopic feature of fruit:** On sectional view, the testa shows the epidermis made up of rectangular to squarish parenchymatous cells coated with cuticle on the outer surface and most of these cells found to possess yellowish-brown contents which give test for protein. Polygonal to oval parenchymatous cells and numerous oil cells make up the several layered zones under the epidermis. The oil containing cells are oval to round, large and with slightly thickened wall. The innermost surface of testa is attached to endosperm. In endosperm, there is a single layer of radially elongated highly thick-walled cells. The parenchymatous cells of the endosperm are found highly thick-walled cells and containing yellowish brown mass. The epidermis of the cotyledon is single layered, and the cells are small, rectangular to squarish in shape and outer walls of the cells are thickened. Ground tissue is mostly composed of thin walled polygonal to oval parenchymatous cells; the cells possess numerous aleurone grains which are simple and oval to round.

**PHYTOCHEMISTRY**

The main bioactive compounds of *Habb-ul-ghar* (Laurel fruit) with a focus on their isolation and identification are listed in Table 4. *Laurus nobilis* fruits contained organic compounds viz. phenolics, steroids, glycoside, fixed and essential oil, tannins, resins, flavonoids, carbohydrates, proteins and iron, calcium, sodium, potassium, etc. phosphate as inorganic compounds.

**Table 3:** Botanical description of *Laurus nobilis* L.\(^7,14,32\)

| Plant parts | Morphological characteristic |
|-------------|-----------------------------|
| Bark        | Smooth, thin and olive green to brown in colour |
| Leaves      | Alternate, lanceolate, bipinnate compound, acuminate at both ends, entire, about 10 cm long, 1.7-1.8 cm wide with short 0.5 cm petiole, margins often sinuate, leathery, dark green, containing cells are oval to round, large and with slightly thickened wall. The parenchymatous cells are thickened. Ground tissue is mostly composed of thin walled polygonal to oval parenchymatous cells; the cells possess numerous aleurone grains which are simple and oval to round. |
| Flower      | Ebracteate, axillary bushy umbels or short racemose panicles, dioecious, small whitish green, 4 petals fused at base, male flower 10-12 stamens, female 4 staminodes’, style short with triangular obtuse stigma |
| Fruit       | Dried, drupaceous, ovoid 1.2-1.6 cm long, 0.6-1.0 cm wide, brownish black; outer surface is glabrous shining and coarsely wrinkled due to the shrinkage of narrow succulent region below the epidermis. At the apex, there is a small point left by the style and a small scar at the base shows the point of fruit to the thalamus. Single see, brownish yellow and bitter in taste, kernel of the seed consists of two large planoconvex cotyledons and a small superior radicle |

**Table 4:** The main secondary metabolites identified from *L. nobilis* (fruit)

| Chemical constituents | Analytical method | Region with reference |
|-----------------------|-------------------|-----------------------|
| Monoterpenes          |                   |                       |
| 1,8-Cineol (eucalyptol) | GC-MS             | Bulgaria,34 Greece,10 Georgia,10 Tunisia,12 India,6 Lebanon35 |
| α-pinene              | GC-MS             | Lebanon,32,33 Turkey,37,38 Bulgaria,34 Greece,10 Tunisia,12 Iran,39 India,6 |
| β-pinene              | GC-MS             | Lebanon,32,33 Turkey,37,38 Bulgaria,34 Greece,10 Iran,39 Tunisia12 |
| α-phellandrene        | GC-MS             | Lebanon,36 Turkey,37 Bulgaria,34 Greece,10 Iran,39 India,6 |
| Sabinene              | GC-MS             | Lebanon,36 Turkey,37,38 Bulgaria,34 Greece,10 |
| Limonene              | GC-MS             | Lebanon,26 Bulgaria34 |
| γ-terpinene           | GC-MS             | Lebanon,26 Turkey,33 Bulgaria34 |
| Linalool              | GC-MS             | Lebanon,31 Turkey,33 Tunisia12 |
| Camphene              | GC-MS             | Lebanon,36 Turkey,37,38 Bulgaria,34 Greece10 |
| Terpinene-4-ol        | GC-MS             | Lebanon,26 Bulgaria,24 Greece,10 Turkey33 |
| α-terpineol           | GC-MS             | Lebanon,36 Turkey38 |
| α-terpinyl acetate    | GC-MS             | Bulgaria,34 Greece,10 Iran,39 Tunisia,12 Turkey33 |
| Bornyl acetate        | GC-MS             | Bulgaria,34 Turkey38 |
| p-cymene              | GC-MS             | Lebanon,26 |
| m-cymene              | GC-MS             | Turkey38 |
| α-thujene             | GC-MS             | Turkey37 |
| Myrcene               | GC-MS             | Lebanon,26 Turkey37 |
| (E)-β-ocimine         | GC-MS             | Bulgaria,24 Georgia,10 Turkey,40 Tunisia,12 Lebanon25 |
| Bicyclogermacrene     | GC-MS             | Turkey40 |
| Chemical Name          | Method  | Country(s)                  |
|------------------------|---------|-----------------------------|
| Eugenol                | GC-MS   | Greece, Turkey, Tunisia      |
| Methyl eugenol         | GC-MS   | Greece, Turkey, Iran         |
| **Sesquiterpenes**     |         |                             |
| Germacrene - A         | GC-MS   | Turkey                      |
| Germacrene- D          | GC-MS   | Turkey, Georgia, Greece      |
| β-elemene              | GC-MS   | Turkey, Bulgaria, Georgia, Iran, Lebanon |
| β-Caryophyllene        | GC-MS   | Bulgaria, Greece, Georgia, Iran |
| Caryophyllene oxide    | HPLC    | Georgia, Greece, Turkey      |
| Caryophylladienol I   | ---     | Turkey                      |
| Lauroxepine            | IR-MS   | Turkey                      |
| Custunolide            | IR-MS   | Turkey, Italy               |
| Gazaniolide            | IR-MS   | Turkey                      |
| Spirafolidine          | IR-MS   | Turkey                      |
| Zaluzanin D            | HPLC    | Italy                       |
| Eremanthin             | HPLC    | Italy, Lebanon               |
| Santamarine            | IR Spectra | Turkey                      |
| Reynosine              | IR Spectra | Turkey                      |
| t-murolol              | ---     | Turkey                      |
| Dehydrocostuslactone   | GC-MS   | Lebanon                     |
| **Flavonoids**         |         |                             |
| Cynidin-3-O-glucoside  | HPLC    | Italy                       |
| Cynidin-3-O-rutisonide | HPLC    | Italy                       |
| Peonidin-3-O-glucoside | HPLC    | Italy                       |
| 3-O-rutisonide peonidine | HPLC | Italy                       |
| Kaempferol             | HPLC    | Greece, Georgia, Italy      |
| Quercetin              | HPLC    | Greece, Georgia, Italy      |
| Apigenin               | HPLC    | Georgia, Italy              |
| Luteolin               | HPLC    | Georgia, Italy              |
| **Fatty acids**        |         |                             |
| Lauric acid            | GC      | Greece, Georgia, Syria, Turkey |
| Palmitic acid          | GC      | Greece, Georgia, Syria, Turkey |
| Oleic acid             | GC      | Greece, Georgia, Syria, Turkey |
| Linoleic acid          | GC      | Greece, Georgia, Syria, Turkey |
| Myristic acid          | GC      | Greece, Georgia             |
| Stearic acid           | GC      | Greece, Georgia, Turkey     |
| Arachidic acid         |         | Turkey                      |
| Butyric acid           |         | Syria                       |
| **Tocopherol, Sterol** |         |                             |
| α-tocopherol           | HPLC    | Greece                      |
| β-tocopherol           | HPLC    | Greece                      |
| γ-tocopherol           | HPLC    | Greece                      |
| β-sitosterol           | GC      | Greece                      |
| Campesterol            | GC      | Greece                      |
**Pharmacological Studies**

**Phenolic acid**

| Phenolic acid                  | Method | Location          |
|--------------------------------|--------|-------------------|
| Vanillic acid                  | HPLC   | Greece, Georgia   |
| Caffeic acid                   | HPLC   | Georgia           |
| Syringic acid                  | HPLC   | Georgia           |
| Ferulic acid                   | HPLC   | Greece, Georgia   |
| Cinnamic acid / methyl cinnamate | HPLC | Greece, Georgia, India |

**Carotenoids**

| Carotenoids          | Method | Location      |
|----------------------|--------|---------------|
| β-carotene           | HPLC   | Israel        |
| Lutein               | HPLC   | Israel        |
| Neoxanthin           | HPLC   | Israel        |

**Norisoprenoid**

| Norisoprenoid          | Method | Location      |
|------------------------|--------|---------------|
| 6-methyl-5-hepten-2-one| GCMS   | Israel        |
| Pseudoionone           | GCMS   | Israel        |
| β-ionone               | GCMS   | Israel        |

**Anti-ulcer activity:** Crude aqueous extracts of 20 and 40% and an oily solution of the seeds of *L. nobilis* were evaluated for anti-ulcer activity. The results revealed that the crude extract and the volatile oil fraction had a gastroprotective effect with the dose of 1 ml/100 g body weight when ulcer was induced at 0.5 ml/100 g ethanol as an ulcerogenic agent. The 40% extract was able to exhibit gastroprotective action when the amount of ethanol was increased to 1 ml/100 g.

**Antioxidant activity:** The antioxidant activities of different extracts of *L. nobilis* fruit (pericarp and kernel) were performed by a DPPH assay and a β-carotene-linoleic acid assay. In the DPPH method, the highest activity (29.43%) was observed in the pericarp extract from maceration with 80% ethanol at the level of 12 µg/ml. Kernel extract obtained by Soxhlet extraction with 80% ethanol showed the most potential activity (50.78%) at the concentration of 12 µg/ml. In the β-carotene-linoleic acid method, pericarp extract of 50% methanol exhibited the strongest neutralising activity (85.56%) of free radicals, and the highest activity was observed in the kernel extract (69.93%) obtained by kinetic extraction with 80% ethanol.

Antioxidative activity of *Laurus nobilis* fruit methanolic extract (crude and defatted) was studied on the level of lipid peroxidation in liposomes induced by the Fe⁴⁺/ascorbate system and measured spectrophotometrically by the TBA-test. The significant inhibition of lipid peroxidation was obtained after applying 2.0 mg crude methanolic extract of laurel fruit.

Ozcon (2010) also evaluated the antioxidant activity of the essential oil and methanolic extract of seed oil from *L. nobilis* by employing two complementary tests, namely DPPH free...
radical scavenging and β-carotene/lipid peroxidation test. This study shows the antioxidant property of the methanolic extract of the seed oil is higher than the essential oil obtained from laurel fruits, and methyl eugenol may be considered the main contributor to this activity66.

In another study, the essential oil from the seed of laurel fruits exhibited a scavenging effect on the DPPH radical, with IC50 values of 66.1±1.8 μg/ml and inhibited oxidation of linoleic acid after 30 as well as 60 min of incubation with IC50 of 41.1±1.2 and 45.9±1.3 μg/ml. The result was found significant (p<0.01) compared to ascorbic acid and propyl gallate as standard control47.

**Antiproliferative activity:** Abu-Dahab et al. (2014) evaluated the antiproliferative activity of ethanol extract of the fruits on human breast adenocarcinoma (MCF7) and human ductal carcinoma (T47D), which exhibited prominent antiproliferative activity with an IC50 of 12.3 μg/ml for T47D cell line and 28 μg/ml for MCF7 cells. The antiproliferative activity of the extracts is attributed to the flavonoids and sesquiterpenes present in the laurel fruits46.

Essential oil of *L. nobilis* fruit has exerted antiproliferative activity against K562 cells with IC50 values of 75 μg/ml. The seed oil showed a 12% erythroid differentiation at the concentration of 50 μg/ml. The result showed that seeds essential oils can inhibit the in vitro proliferation of K562 cells47.

In another study, cytotoxicity was determined against A2780 human ovarian cancer cells using a microtiter plate assay, and actinomycin D was used as a positive control. The crude methanol extracts of fruits of *L. nobilis* showed the highest activity with 98% inhibition. The sesquiterpenes costunolide and zaluzanin D, which are present in the laurel fruits, are considered to be responsible for the observed cytotoxicity23.

**Antimicrobial activity:** The antimicrobial activity of ethanolic crude extracts of *L. nobilis* fruit was evaluated against four Gram-positive bacteria (*Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus*, Bacillus subtilis, and *Bacillus cereus*), five Gram-negative bacteria (*Escherichia coli*, Klebsiella pneumonia, *Salmonella typhimurium*, and *Chromobacterium violaceum* Pseudomonas aeruginosa), four fungal species was included viz. *Aspergillus fumigatus*, *Aspergillus niger*, Candida albicans, and Candida glabrata using the agar diffusion method. The result showed a moderate zone of inhibition against all bacteria and fungi. Also, an anti-quorum sensing assay was done at the concentration of 3 mg per disc. *Chromobacterium violaceum* quorum sensing system was used for this test, and Tetracycline was used as a positive control. The quorum sensing zone of inhibition was observed 15±0.9 for the laurel fruit49.

In another study, methanolic extract of seed oil showed significant antimicrobial activity against Gram-positive bacteria viz. *S. aureus*, methicillin-resistant *S. aureus*, *B. subtilis*, *E. gallinarum*, *L. monocytogenes*, and one Gram-negative bacteria, *H. influenza*, on agar well diffusion method46.

The antimicrobial activity of fatty oil from *L. nobilis* fruit was evaluated with minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) by a microtiter broth dilution method against *S. epidermidis*, *E. faecalis*, *P. aeruginosa*, *S. aureus*, and *E. coli*. The result showed that fatty oil has good antibacterial activities50.

**Clinical trial:** A Single-blind randomised standard controlled study for the primary dysmenorrhoea was conducted at NIUM Hospital, Bengaluru. *Habb ul Ghar* powder 4.5g was used to make a pill, and 2 pills TID with 20 ml Mual Asal was given to the patients for five days. Mefenamic acid 500 mg BD was used as a standard drug. The results were analysed based on visual analogue scale (VAS) and verbal multidimensional scoring system (VMSS), which was enormously significant (p<0.001) and almost equivalent to the standard control53.

**CONCLUSION**

*Laurus nobilis* L., a plant of Lauraceae family, has been mentioned in the Unani system of medicine as Habb-ul-Ghar. There are several phytoconstituents in *Laurus* fruit that are significant components in the plant’s medicinal effectiveness. Many studies have found its strong anti-inflammatory, antimicrobial, antiproliferative, anti-oxidant properties. A comprehensive research and development effort should be made to develop products for better economic and therapeutic use. Also, more clinical trials are needed to validate the therapeutic efficacy of this Unani drug.
Declaration of competing interest

There is no conflict of interest.

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