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Karafs (*Apium graveolens* Linn) An in-depth review of its historical context, therapeutic properties, ethno pharmacological applications, and scientific research

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Abstract
Karafs (*Apium graveolens* L.), commonly known as celery, holds a prominent position in traditional herbal medicine, particularly in the Unani system, owing to its diverse therapeutic properties. This biennial plant, belonging to the Apiaceae family, has been utilized for centuries for its medicinal benefits. *Karafs* is recognized for its efficacy as an antimicrobial, antiparasitic, cardioprotective, gastroprotective, neuroprotective, hypolipidemic, cytotoxic, antioxidant, anti-inflammatory, and anti-infertility agent. Its seeds, leaves, and stems are extensively employed to address various ailments, supported by phytochemical and nutritional analyses revealing the presence of fatty acids, sesquiterpenes alcohol, essential oils, vitamin C, beta carotene, fat, protein, and minerals. This comprehensive review aims to elucidate *Karafs's* historical context, therapeutic properties, ethnopharmacological applications, and recent scientific research, highlighting its enduring significance in traditional and contemporary medicinal practices.

Keywords: Tukhm-e- Karafs, Karafs, *Apium graveolens* L., Unani medicine

Introduction
Tukhm-e-Karafs, also referred to as the seeds of *Apium graveolens* L., is widely utilized in traditional medicine to address various ailments. This aromatic herb is characterized by its annual or biennial growth, featuring a succulent taproot, angular or fistular stem, pinnate or trifoliate leaves, and white flowers. It can be found both in the wild and cultivated for its seeds and whole herb, often used in salads. Originating from Europe and Western Asia, it has been introduced to numerous countries. Renowned for its aromatic qualities, it is particularly valued in traditional medicinal practices. Its flowering and fruit-bearing typically occur between February and March [1].

Scientific Classification: [2]

Table 1: Scientific Classification

Kingdom:	Plantae
Subkingdom:	Viridiplantae
Infrakingdom:	Streptophyta
Superdivision:	Embryophyta
Division:	Tracheophyta
Subdivision:	Spermatophytina
Class:	Magnoliopsida
Superorder:	Asteranae
Order:	Apiales
Family:	Apiaceae
Genus:	*Apium L.*
Species:	*Apium graveolens L.*

Botanical name: *Apium graveolens* Linn [6]
Botanical description: *Apium herbs* are known to grow either annually or biennially, standing upright and attaining heights ranging from 30cm to 1m. They typically feature tuberous roots and pinnately compound leaves with elongated stalks. The flowers of Apium plants are typically greenish-white and are arranged in terminal compound umbels. The fruit of Apium is a cremocarp [7]
Vernacular name: [3-6]

Vernacular name: [3-6]

Table 2: Vernacular name

Arabic:	Karafs
Persian:	Karsab
Unani:	Karafsa, Saalyun
Bengali:	Chandani
Hindi:	Ajmoda, Ajmud, Bhut-jata
Siddha/Tamil:	Celery-keerai
Marathi:	Ajamoda-nova
Urdu:	Ajmud, Karafs
English:	Celery, Marsh parsley

Fig 1: Tukhm-e-Karafs (*Apium graveolens* L.)

***Mahiyat* (Morphological characters described in *Unani* Literature):** The leaves of *Karafs* are round and well-edged; the flowers are yellow; and the branches are thin. The plant is up to a 1-metre-high, and the root is black in colour and has fine fibres attached to it and is most potent in action. In Arabic, the seed is known as *Bazrul karafs*, and in Persian, it is known as *Tukhum-e-Karafs*. The seed is round, blackish in color, has a strong flavor, and has a non-greasy surface [8].

Habitat: *Karafs* is a plant that grows upright and is either annual or biennial. It originated in Europe but has now spread and can be found growing wild in certain parts of the Himalayas and the Punjab, Himachal Pradesh, and Uttar Pradesh regions [4].

Cultivation and Collection: It is a moisture-loving plant that requires a cool climate and regular irrigation. In India, celery is primarily grown for seed production and is sowed in September to October, with seedlings transplanted in December or January. The seed crop is typically ready for harvest by the middle of May. Hot water treatment of seeds can help reduce the incidence of blights. The seeds are harvested when the flowers turn reddish, and the plants are left to dry for a few days before being threshed to extract the seeds. The seeds are then graded using sieves and the average yield of celery seeds is around one tonne per hectare [9].

***Mizaj* (Temperament):** The temperament of *Karafs* is hot in 2nd degree and dry in 2nd. degree. [3, 5]

***Afa'al* (Pharmacological actions):** [3, 5, 8, 10, 11]

Table 3: Pharmacological actions

Musakkin-i-Suda	(Relieve Headache)
Muhallil	(Resolvent)
Qātil-i-Dīdān	(Anthelmintic)
Mufattit-i-Hasāh	(Lithotriptic)
Mugharrī	(Glueing drug)
Mushtahī	(Appetizer)
Musakkin-i-Dimāgh	(Sedative)
Dafi'-i-Maghs	(Antitenesmus)
Kāsir-i-Riyāh	(Carminative)
Mukhrij-i-Janīn	(abortifacient)
Mudirr-i-Hayd	(Emmenogogue)
Mulayyin-i-Am'ā'	(Laxative)
Mufattih-i- Sudad	(Remove obstruction)
Dafi'-i-Tashannuj	(Antispasmodic)
Mu'arriq	(Diaphoretic)
Mudirr-i-Bawl	(Diuretic)
Muqawwī	(Tonic)
Muqawwi-i-Bāh	(Aphrodisiac)

***Iste'malat* (Therapeutic uses):** [3, 5, 8, 10, 11]

Table 4: Therapeutic uses

Waja' al-Zahr	(Backache)
Dhāt al-Janb	(Pleurisy)
Istisqā'	(Oedema)
Hudūr	(Rheumatism)
Balghami amraz	(Phlegmatic diseases)
Nafkh al-Mi'da	(Flatulence)
Hasāh al-Kulya	(Nephrolithiasis)
Ihtibās al-Bawl	(Retention of urine)
Suda	(Headache)
Niqris	(Gout)
Hasāh al-Mathāna	(Cystolithiasis)
Waja' al-Mathāna	(Cystodynia)
Dīq al-Nafas	(Bronchial asthma)
Maghs	(Tenesmus)
Irq al-Nasā	(Sciatica)
Qay'	(Vomiting)
Waja' al-Kulya	(Renal pain)

Ethnopharmacological uses: The seeds of this plant are believed to have anti-inflammatory properties and are used to treat a range of conditions involving inflammation, such as rheumatic disorders and inflammation of the urinary tract. They are also thought to have diuretic, carminative, nervine, sedative, antiemetic, antispasmodic, and antiseptic properties, and have been used to treat bronchitis, asthma, and liver and spleen diseases. The essential oil extracted from the seeds is said to have tranquilizing, anticonvulsant, and antifungal effects. The seeds are also used to treat chronic skin disorders, including psoriasis [4].

***Ajza-i-Mustamila* (Parts used):** Roots and seeds [3].

***Miqdar-i-Khurak* (Therapeutic dose):** The therapeutic dosage of *Tukhm-e-Karafs* is 3-5 masha and of *Bekh-e- karafs* is 5-7 masha [3].

***Tarqib-i-Iste'mal* (Method of use)**

- Decoction of Seeds mixed with honey is useful to remove *Balgham* from stomach and intestines [11].
- A decoction or poultice made from seeds can be used to alleviate back pain, sciatica, gout, and rheumatoid arthritis [11].

- Warts can be removed by applying a mixture of *Karafs* and *Naushadar* (ammonium chloride) [5].
- Consuming *Karafs* with common salt may stimulate appetite [8].

Muzarrat Toxicities / Adverse effects of *Karafs:* Contraindicated in Lactating mothers, Epilepsy, Pregnant women, people with hot temperament, inflammation of the kidneys and renal disorders [3, 5].

Muslehat (Correctives) for *Karafs*: In case of any adverse effect produced by *Karafs* either *Anisoon* (*Pimpinella anisum* L.) or *Mastagi* (*Pistacia lenticus* L.) may be given to patients [5]

Badal* (Therapeutic Interchange) for *Karafs: The therapeutic interchange for the *Karafs* is *Ajwain Khurasani* (*Hyoscyamus Niger* L.) [5].

***Murakkabat* (Compound formulations):** [12]

Table 5: Compound formulations

Majoon-i-Jograj Gugal	*Majoon-i-Kalkalanaj*
Majoon foodnaj	*Majoon-i-Jalali*
Majoon hajrul yahood	*Shiyaf-i-Kundur*
Jawarish-i-Falafili	*Jawarish-i-Zarooni Sada*
Jawarish-i-Shahreyaran	*Jawarish-i-Safarjali*
Banadiq-ul-Buzoor	*Sikanjabeen Buzoori Motadil*
Dawaul kurkum kabir	*Sufoof-i-Namak Sheikh-ur-Raees*
Zimad sumbulut teeb	*Sufoof mohazzil,*

Chemical Constituents: The celery plant is known to contain a range of compounds including glycosides, steroids, and a variety of phenolic compounds like furanocoumarins and flavones. It also contains trace amounts of minerals including sodium, potassium, calcium, and iron [9, 13]. The roots of the celery plant contain falcarinol, falcarindiol, panaxidol, and 8-O-methyl falcarindiol [14]. The stem of the celery plant contains a pectic polysaccharide known as apiuman, composed of d-galacturonic acid, rhamnose, arabinose, and galactose. [15] The leaves of celery contain various compounds, as identified through gas chromatography-mass spectrometry analysis of the volatile oil extracted from them. These compounds include methyl ester of 9-octadecen-12-ynoic acid, 1-dodecanol, and acetate of tetradecene-1-ol [16].

Scientific studies

Hepatoprotective activity: A methanolic extract of celery seeds has been found to be effective at protecting against liver damage caused by paracetamol and carbon tetrachloride in animal studies. The extract was also able to reduce levels of various liver injury markers, including alanine transaminase, aspartate transaminase, alkaline phosphatase, albumin, and total protein, when compared to a liver protective agent called silymarin. Furthermore, it exhibited the capability to counteract the adverse structural alterations in liver tissue induced by paracetamol.

In another study, incorporating celery into the diet along with chicory and barley was found to lower elevated liver enzymes and improve lipid profiles in animals on high cholesterol diets. 215, 216 Celery is a good source of phenolic compounds, which provide antioxidant activity. The leaves of celery have been found to have strong antioxidant properties through their ability to scavenge the 1,1-diphenyl 2-picrylhydrazyl radical. The potential antioxidant properties of celery are believed to stem from its rich composition of L-tryptophan and derivatives of methoxy-phenyl chromenone. A research study revealed that both organic and inorganic extracts derived from celery exhibited notable efficacy in scavenging hydroxyl (OH) and DPPH radicals. Furthermore, in animal trials, extracts of celery demonstrated significant protective capabilities against toxicity induced by CCL4 [16, 17, 18].

Hypolipidemic activity: In STZ-diabetic rats (Streptozotocin-induced diabetic rats), hexane seed extract of *Apium* significantly raised insulin and HDL (high density lipoprotein) levels while lowering glucose TGs (triglycerides) and TC (total cholesterol) levels [18].

Antidiabetic activity: In animal studies, the aqueous extract of celery seeds has been shown to alter the lipid profile and exhibit antidiabetic effects when administered intraperitoneally [19].

Anti-inflammatory activity: Aqueous and alcoholic extracts from celery stem, as well as a compound found in celery stem called phytosterol, were found to reduce inflammation in rats when tested. These extracts were made using water (aqueous) and ethanol as solvents [20].

Analgesic activity: The ethanolic extract of celery seeds has been shown to have significant analgesic activity in animal studies using the acetic acid-induced writhing and hot plate methods. The observed effect might be attributed to celery's interaction with the cytochrome P450 pathway [21].

Antioxidant activity: Methanol extracts taken from the root and leaves of a plant have been found to have antioxidant properties [17].

Hypocholesterolemic activity: The hydroalcoholic extract of celery has been shown to lower cholesterol, triglycerides, and low-density lipoprotein in rats on a high-fat diet. The hypocholesterolemic effect of celery may be due to its effects on bile acid secretion and the presence of polar compounds with sugar/amino acid moieties in the extract [22].

Anti-spasmolytic activity: The ethanolic extract of celery has demonstrated significant anti-spasmolytic activity, inhibiting the ileum contractions in animal studies [23].

Conclusion

In summary, the thorough review of Tukhm-e-Karafs (*Apium graveolens* L.) provided in this paper sheds light on its extensive historical importance, diverse therapeutic applications, and significant role in traditional medicinal practices like Unani medicine. Through, centuries of traditional use and recent scientific investigations, *Karafs* has emerged as a valuable botanical resource with a diverse array of therapeutic properties. From its botanical description to its ethno pharmacological applications, *Karafs* has been revered for its multifaceted contributions to health and wellness. Its pharmacological actions, ranging from diuretic and carminative to sedative and anthelmintic, underscore its holistic approach to addressing various ailments. Furthermore, its diverse therapeutic uses, including the treatment of nephrolithiasis, bronchial asthma, gout, and rheumatism, highlight its broad spectrum of applications in traditional healing practices. Scientific studies have provided compelling

evidence supporting many of the traditional uses of *Karafs*. From hepatoprotective and hypolipidemic activities to anti-inflammatory and antioxidant properties, the plant exhibits a wealth of bioactive compounds that contribute to its medicinal efficacy. Moreover, studies on its analgesic and antidiabetic activities further reinforce its therapeutic potential in managing complex health conditions. Despite its rich therapeutic heritage, it's essential to acknowledge the need for further research to explore the full extent of *Karafs's* medicinal properties and mechanisms of action. Continued scientific inquiry holds promise for uncovering novel therapeutic applications and refining existing traditional practices. Additionally, efforts to ensure sustainable cultivation and conservation of *Karafs* are paramount to preserving its medicinal heritage for future generations.

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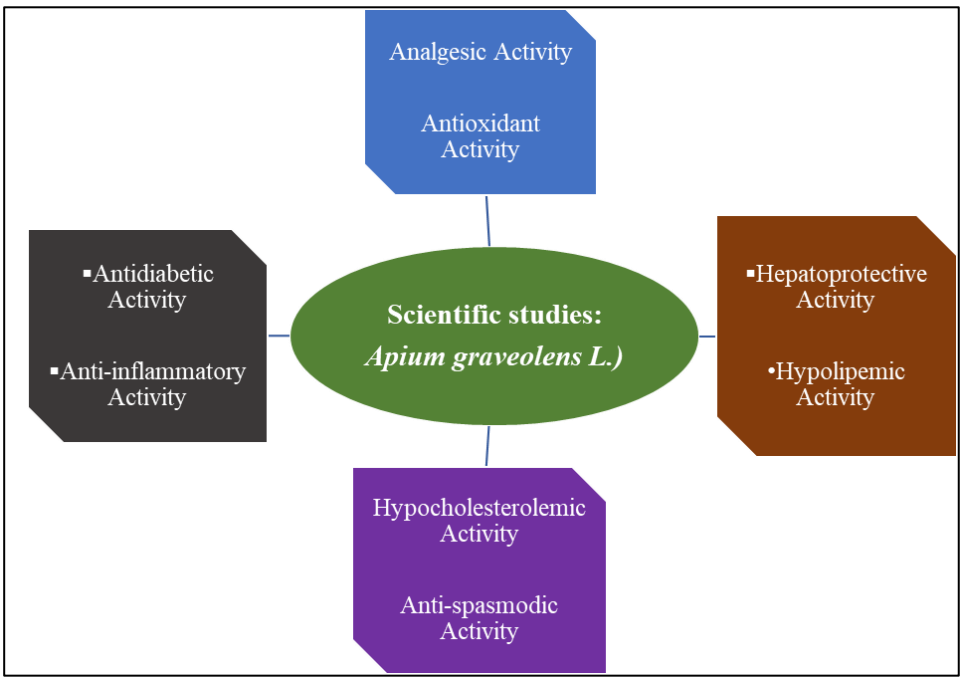
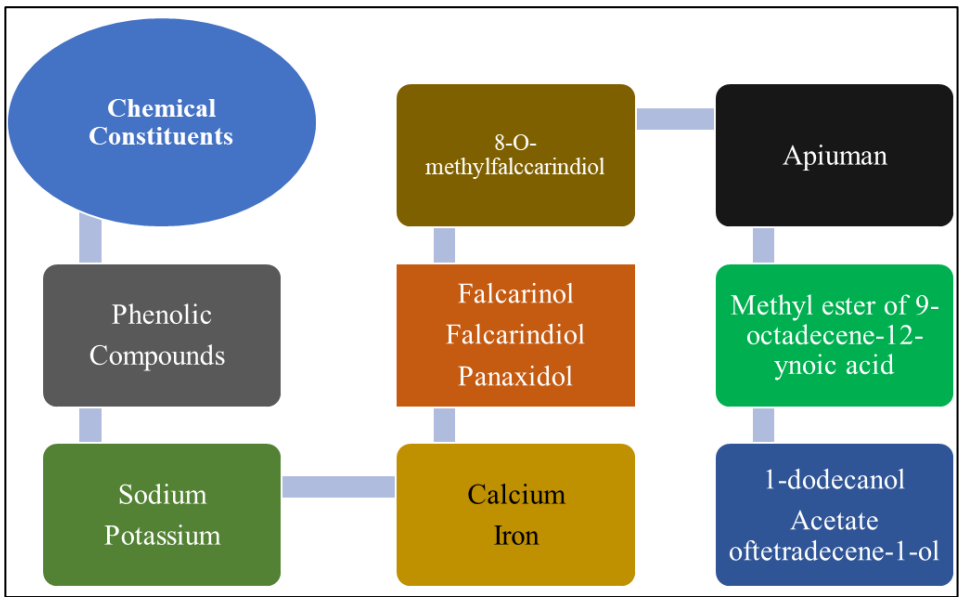
Abbreviation: STZ-diabetic rats (Streptozotocin-induced diabetic rats),
HDL (high density lipoprotein)
TGs (triglycerides),
TC (total cholesterol)





Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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