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Tukhm-e-Karafs: Pharmacological Insights and Unani Applications of Apium graveolens L.

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Abstract

Karafs, obtained from the entire plant of Apium graveolens L. (family Apiaceae),is a versatile herb widely recognized in various cultures. Its seeds, also called as Tukhm-e-Karafs in Unani system of medicine, are utilized globally as a spice, while the leaves and roots serve as components in culinary salads. Known by names such as Apio (Spanish), Céleri (French), Selderij (Dutch), Qin Cai (Chinese), and Syelderey (Russian), this plant is cultivated across regions including North Africa, Europe, Western Asia, and parts of India such as Himachal Pradesh, Uttar Pradesh, and Punjab. In Unani medicine, Karafs seeds are employed either alone or in compound formulations to address a range of health conditions. Pharmacologically, the seeds exhibit properties such as hepatoprotective, diuretic, and lithotriptic effects. In Unani medicine, the seeds are recognized for properties such as Kāsir-i-Riyāh (carminative), Dafi'-i-Tashannuj (antispasmodic), Mufattit-i-Hasāh (lithotriptic), and Mudirr-i-Bawl (diuretic). These properties make them effective in managing ailments such as Hasāh al-Kulya (nephrolithiasis), Istisqā' (edema), Nafkh al-Mi'da (flatulence), and Ihtibās al-Baul (urinary retention). The widespread cultivation and multifaceted applications of Apium graveolens underscore its significance in both traditional and complementary medical systems.

Keywords: *Apium graveolens, versatile herb, Unani medicine, hepatoprotective, nephrolithiasis.*

Introduction

Tukhm-e-Karafs refers to the seeds (mericarps) of *Apium graveolens* L., is a prominent medicinal ingredient in the Unani system of medicine, employed for managing a variety of health conditions. This aromatic, glabrous herb, which may grow as an annual or biennial, features a robust taproot, stems that are either angular or fistular (hollow), leaves that are pinnate to trifoliate in structure, and small white flowers. The plant flourishes between November and March, with its flowering and fruiting phases mainly taking place during February and March. Native to Europe and Western Asia, *Apium graveolens* is now both wild and cultivated across numerous regions worldwide, valued for its seeds, which are used as a spice, while its leaves and roots are commonly consumed as a salad vegetable. Beyond its culinary uses, this herb holds a significant place in traditional medicine systems, including Unani and various folk remedies, owing to its aromatic and therapeutic properties. Its widespread cultivation and diverse applications highlight its importance in both medicinal and cultural contexts globally [1].

Taxonomical classification

Taxonomic Rank	Classification
Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliopsida
Subclass	Rosidae
Order	Apiales
Family	Apiaceae
Genus	Apium
Species	A. graveolens Linn

Nomenclature

Tukhm-e-Karafs (seeds of *Apium graveolens* Linn) is known by different names worldwide [2].

Vernacular Names

Arabic	Karafs, Tukhm-e-Karafs, Habb-ul-Karafs, Fitra Saliyun, Samarul Karafs
Urdu	Ajmod, Tukhm-e-Karafs
English	Wild Celery, Celery, Smallage, Marsh Parsley, Apium
Unani	Saalyun, Karafsa
French	Ache, Apibausguas, Api, Ache Cultivée

German	Sellerie, Eppich, Wassereppich, Sumpfeppich, Wassermark, Wasserpeterlein, Wildersellerie
Italian	Sedano, Appio
Persian	Karafskohi, Karafs, Tukhm-e-Karafs, Karafsh, Tukhm-e-Karasb, Karasb
Russian	Selderei Dikiy
Spanish	Apio, Apiocomún
Hindi	Ajmod, Bari Ajmod, Ajmud, Boriajmud, Karafs, Ajmoda
Sanskrit	Ugragandha, Ajmoda, Brahmakoshi, Dipyaka, Mayura, AndhaPatriki, Shikkimoda, Gandhadala, Vastamoda, Vishali

Geographical Distribution

Tukhm-e-Karafs is found in various global regions, including Persia, North Africa, Western Asia, Europe, Afghanistan, and Abyssinia. In India, it is commonly grown in places like the Western Himalayas, North-West Himalayas, Himachal Pradesh, Uttar Pradesh, Western Uttar Pradesh, Punjab's Outlying Hills, Bengal, Bombay, Western India, and Uttarakhand's hills. Karafs, a herbaceous plant, has a thickened root at its neck. Its stem is grooved and branched. The leaves are pinnate, with segments that are wedge-shaped and serrated. Umbels are either axillary or almost sessile at the stalk's apex, lacking involucres. The flowers are greenish-white, with an obsolete calyx, rounded entire petals, and a depressed disk (Figure 1). The fruit is rounded, laterally compressed, and consists of two halves. Each half-fruit bears five equal, filiform ridges, with the lateral ridges forming the margin (Figure 2) [3,4,5,6].

Fig-1: Flowers

Fig-2: Fruit / Seeds

Traditional Unani Perspective on Karafs

Within the Unani medicinal framework, drug terminology predominantly originates from Arabic or Persian sources. In the Persian language, *Apium graveolens* Linn is known as *Karafs*, equating to the same plant, with its seeds known as *Tukhm-e-Karafs*. According to Hussain, Karafs aligns with the celery recognized by Europeans and is referred to as *Udasaliyon* in Greek pharmacology. He identifies five distinct varieties of Karafs: '*Bustani*' (cultivated in gardens), *Jabli* (found in mountainous areas), *Sakhuri* (growing on rocky terrains), *Nabti* (thriving in shaded locales), and *Maiee* or *Tari* (occurring near ponds or water bodies). Hussain further explains that in Greek, the varieties Nabti, Sakhuri, and Maiee are referred to as Akusaliyun, Fiturasaliyun, and Samarniyun, respectively [7]. Al-Biruni notes that in regions such as Tirmidh, Khatl, and Bukharistan, Karafs is locally referred to as Sumbul [8].

Additionally, scholars like Avicenna and Ibn Baitar categorize Karafs into five varieties: Bustani, Mashriqi, Jabli, Sakhuri, and Qabrisi [9,10]. It is likely that the Arabs derived their understanding of Tukhm-e-Karafs from Greek sources. Dioscorides identifies five types of Karafs, suggesting that the Selnion described by Theophrastus may correspond to celery. He further notes that the wild varieties, Jabli and Sakhuri, encompass distinct sub-varieties, including one with a garlic-like bud, another with a fragrant, rose-like bud, and a third characterized by a milky white bud [11]. Ibn Baitar, referencing Dioscorides, describes the seeds of Fiturasaliyun (Sakhuri) as resembling those of Ajowan (Ptycotis ajowan DC) but possessing a more intense aroma [10]. Rhazes notes that the Maiee or Tari variety, which thrives near water, is larger than the cultivated Bustani type, while the wild Jabli or Sakhuri variety, originating from Roman regions, has a bitter flavor. Azam Khan explains that Karafs varieties are named based on their geographical or ecological origins. He provides a concise description of the Bustani variety, characterizing its leaves as rounded with multiple lobed, serrated edges. The plant grows to approximately one yard tall, bears yellow flowers, and produces small, round fruits similar in size to anise seeds, which are blackish, dull, acrid in taste, and aromatic. The roots are large, dark, and fibrous [12]. Najmul Ghani describes the flowers as white, with both the flowers and seeds arranged in an umbrella-like pattern. The seeds have a pungent taste with a hint of mint[13]. Modern scientific studies of Apium graveolens provide a description that closely aligns with the accounts of earlier pharmacological scholars [14].Temperament (Mizaj)Haar 1^0 Yabis 1^0,Haar 1^0 Yabis 2^0Haar 2^0 Yabis 2^0Har [15,16].

Pharmacological Actions (Afal)

The medicinal properties of Tukhm-e-Karafs include: Appetizer (*Mushtahī*), Diuretic (*Mudirr-i-Bawl*), Emmenagogue (*Mudirr-i-Hayd*), Carminative (*Kāsir-i-Riyāh*), Lithotriptic (*Mufattit-i-Hasāh*), Deobstruent (*Mufattih-i-Sudad*), Aphrodisiac (*Muqawwi-i-Bāh*), Diaphoretic (*Mu'arriq*), Laxative (*Mulayyin-i-Am'ā'*), Sedative (*Musakkin-i-Dimāgh*), Anthelmintic (*Qātil-i-Dīdān*), Tonic (*Muqawwī*), Abortifacient (*Mukhrij-i-Janīn*), Stimulant (*Mugharrī*), Antispasmodic (*Dafi'-i-Tashannuj*), Anti-tenesmus (*Dafi'-i-Maghs*), Headache Reliever (*Musakkin-i-Suda*), and beneficial for eye conditions [1,5,17,18].

Contraindications (Muzarrat)

Not recommended for individuals with epilepsy, pregnant women, lactating mothers, or those with a hot temperament [19].

Correctives (Musleh)

Mastaghi and Anisoon [20].

Substitute (Badal)

Ajwain (Carom seeds).
Ajwain Khurasani (Hyoscyamus seeds) [21].

Dosage (Miqdār-e-Khurāk)

Root of Karafs (Celery root): 5 to 7 masha.
Tukhm (Seeds) [22].

Compound Formulations

Several traditional Unani formulations incorporate *Karafs* for various therapeutic purposes. For enhancing general wellness and vitality, commonly prescribed remedies include *Banadiqul Buzoori*, *Dawa-e-Kabir Kurkum*, and *Habbe Khabsul Hadeed*. To support digestive health, Unani practitioners frequently recommend preparations such as *Jawarish Falafili*, *Jawarish Safarjali Qabiz*, *Jawarish Zarooni Sada*, *Jawarish Zarooni Ambari*, *Jawarish Shehreyaran*, and *Jawarish Narmushk*. Strength-building tonics and compound formulations like *Majoon Jalali*, *Majoon Foodnaj*, *Majoon Hajrul Yahood*, *Majoon Jograj Gugal*, *Majoon Kalkalanaj*, *Majoon Nankhwah*, and *Majoon Dabeedul Ward* are also widely used in Unani medicine. For detoxification and body cooling, syrups such as *Sharbat Bozoori Haar* and *Sikanjabeen Buzoori Motadil* are typically advised. Additionally, powdered formulations like *Sufoof Namak Sheikhur Raees*, *Sufoof Moya*, *Sufoof Mohazzil*, and *Sufoof Habbur Rumman* are used to address a variety of health conditions. For topical treatment, Unani tradition also includes external applications like *Zimad Sumbulut Teeb* [23].

Chemical Constituents

Apium graveolens (celery) is rich in a wide array of chemical constituents, such as carbohydrates, flavonoids, alkaloids, steroids, glycosides, phenolic compounds, furocoumarins, essential oils, sesquiterpene alcohols, fatty acids, and various trace minerals. Celery (*Apium graveolens*) also contains a rich profile of bioactive compounds and nutrients. Among its key constituents are phthalides such as ligustilide, sedanolide, sedanenolide, and 3-butyl-4,5-dihydrophthalide. The plant also yields a variety of coumarins, including bergapten, isopimpinellin, osthenol, seselin, apigravin, and celerin, as well as glycosides like apiumoside and celeroside. Its essential oil composition features delta-limonene, terpinene-4-ol, dihydrocarvone, p-cymene, and various sesquiterpenes, including α-selinene, santalol, and both α- and β-eudesmol. The plant also contains isoimperatorin, isoquercitrin, guaiacol, and 3-N-butylphthalide.

In terms of nutrients, celery is a good source of linoleic acid, magnesium, phosphorus, silicon, zinc, and volatile oils. It also provides a range of vitamins, notably A, C, and the B-complex, and is especially rich in beta-carotene and folic acid [24,25,26,27,28,29,30].

Physicochemical Profile of Tukhm-e-Karafs (*Apium graveolens* L.)

The quality of a medicinal drug is fundamentally determined by its physicochemical properties, as these directly influence its therapeutic efficacy. The pharmacological activity of a drug largely depends on its secondary metabolites and chemical constituents. Any variation in these parameters can lead to inconsistencies in therapeutic outcomes. Therefore, to ensure uniform efficacy and safety, it is essential to evaluate these standards in the crude drug prior to its use, whether administered individually or as part of a compound formulation.

To ensure consistency between batches and to achieve the intended therapeutic outcomes at a specified dosage, the following physicochemical parameters have been established as quality control standards (see Table 1).

Table-1: Physicochemical Profile of Tukhm-e-Karafs for Standardization

Parameter	Standard
Maximum foreign organic matter	1% or less
Total ash content limit	Up to 10%
Acid-insoluble ash maximum	2% or less
Minimum volatile oil content	1.5% or more
Specific gravity	Between 0.870 and 0.895
Optical rotation	Ranging from +67° to +79°
Moisture content (Seeds)	5–11%
Moisture content (Leaves)	80.3–93.5%
Ash value (Seeds)	6.9–11.0%
Crude fiber (Seeds)	1.4–10.2%
Cold water-soluble extract (Seeds)	5.9–12.9%

Adhering to these standards is critical for maintaining the consistency, safety, and effectiveness of herbal medicines and formulations derived from the crude drug [31,32].

Pharmacological Activities of Karafs (Apium graveolens)

Hepatoprotective Activity

Studies have shown that the leaves of celery (*Apium graveolens*) exhibit hepatoprotective effects against acetaminophen (APAP)-induced liver toxicity in the freshwater fish *Pangasius sutchi* [33]. Furthermore, research has revealed that methanolic extracts of *Apium graveolens* possess hepatoprotective activity comparable to that of the standard hepatoprotective agent, silymarin [34]. Moreover, methanolic extracts of *Tukhm-e-Karafs* have demonstrated liver-protective effects in rats subjected to paracetamol-induced hepatotoxicity [35].

Hypolipidemic Activity of Karafs (Apium graveolens)

Research has shown that the ethanolic extract of *Apium graveolens* possesses hypolipidemic properties in adult male albino rats [36]. Additionally, the leaves of *Karafs* have demonstrated lipid-lowering effects in diabetic rat models [37]. Research also suggests that ethanolic extracts of *celery seeds* exhibit antidyslipidemic activity in mice with ritonavir-induced dyslipidemia [38]. In a fructose-induced hypertension animal model, celery leaf extract significantly reduced systolic blood pressure, total cholesterol, triglycerides, low-density lipoprotein (LDL), and very-low-density lipoprotein (VLDL) levels [39].

Antioxidant Effects of *Karafs* (Apium graveolens)

Studies indicate that the n-butanol extract from the seeds of *Apium graveolens* (celery) reduces lipid peroxidation and improves antioxidant levels in rats with streptozotocin-induced diabetes [40].

Acetone and methanol extracts of *Apium graveolens* have been shown to exhibit significant antioxidant activity [41].

Antidepressant Effects of *Karafs* (*Apium graveolens*)

The methanolic extract of *Apium graveolens* seeds, at a dose of 200 mg/kg, demonstrated significant antidepressant effects in animal models, with efficacy comparable to the standard drug Imipramine at 20 mg/kg [42].

Spermatogenesis Activity of *Karafs* (Apium graveolens)

Research has shown that the aqueous extract from *Apium graveolens* L. (celery) leaves enhances spermatogenesis in male rats when given at doses of 100 and 200 mg/kg body weight for 30 days [43].

Anti-Hyperuricemic Activity of Karafs (Apium graveolens)

Research has demonstrated that Bekh Karafs (Apium graveolens) exhibits significant anti-hyperuricemic effects in human subjects when administered at a dose of 10 gm daily for 45 days. Compared to the standard drug allopurinol, given at 100 mg three times daily for the same duration, the test drug showed more pronounced efficacy [44].

Conclusion

Karafs (Apium graveolens), a prominent herb in Unani medicine characterized by its hot and dry temperament, is employed to address disorders associated with cold temperament, either independently or in compound formulations. Its nephroprotective, diuretic, and lithotriptic properties, validated in animal models, are attributed to its bioactive secondary metabolites. Following Unani's holistic principles, Karafs is utilized in its crude form to treat the body as an integrated system. Its diuretic properties likely contribute to its antihypertensive effects, while its anticancer, antitumor, and cytoprotective activities suggest potential in carcinoma management. The herb exhibits antiparkinsonian, antidepressant, and memory-enhancing properties, suggesting its potential in treating conditions like depression, insomnia, amnesia, and Alzheimer's disease. Additionally, its antimicrobial and anti-inflammatory effects aid in managing infections and fevers, while its antihyperlipidemic properties are beneficial for addressing obesity, polycystic ovarian syndrome, and cardiovascular disorders.

According to Unani literature, *Karafs* is traditionally used to manage various health conditions such as headache, back pain, bronchial asthma, flatulence, vomiting, sciatica, tenesmus, pleurisy, edema, urinary retention, renal pain, gout, rheumatism, cystolithiasis, and nephrolithiasis. Further animal studies are warranted to substantiate its efficacy for respiratory and joint-related conditions, followed by clinical trials to confirm these effects in humans. In Unani practice, Karafs is preferred in its natural form to facilitate metabolism, replenish nutrients, and bolster immunity. While its phytochemical constituents can be analyzed, the whole herb is favored to minimize potential adverse effects.

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