

A comprehensive review on *Tukhm-e-Karafs* (*Apium graveolens* L.) with special reference to Unani System of Medicine

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ABSTRACT

The *Karafs* is a dried herb of whole plant of *Apium graveolens* L. from Apiaceae (carrot family). The seeds (fruits) of *Apium graveolens* are known as *Tukhm-e-Karafs* in Unani Medicine. *Karafs* is known as Celery in French, Apio in Spanish, Selderij in Dutch, Syelderey in Russian and Chin in Chinese. It is cultivated in different parts of the world for its seeds as spice and green leaves and root as salad crop. Its seeds are also used for medicinal purposes in complementary and alternative medicines. In Unani it is used as a single drug or as an ingredient in compound formulations used for management in various ailments. The seeds have various pharmacological actions like hepatoprotective, diuretic and lithotriptic etc. It is commonly found in Western Asia, Europe, North Africa and various parts of India like Punjab, Uttar Pradesh and Himachal Pradesh etc. In Unani its actions are described as *Mudirr-i-Bawl* (Diuretic), *Mufattit-i-Hasāh* (Lithotriptic), *Dafi'-i-Tashannuj* (Antispasmodic) and *Kāsir-i-Riyāh* (Carminative). It is used for the treatment of *Hasah al-Kulya* (Nephrolithiasis), *Nafkh al-Mi'da* (Flatulence), *Istisqā'* (Oedema) and *Ihtibās al-Bawl* (Retention of urine) etc.

Keywords Apigenin, *Apium graveolens*, *Karafs*, *Kulya*, Nephrolithiasis, Unani

1. INTRODUCTION

Tukhm-e-Karafs is the seeds (fruit) of the *Apium graveolens* L. and frequently used in Unani system of Medicine for the treatment of various diseases. It is an erect, annual or biennial, aromatic glabrous herb, with succulent, well developed tap root, branching angular or fistular stem, pinnate or trifoliate leaves and white flower. The plant occurs from November to March. Flowering and fruiting take place during the month of February to March. It is wild as well as cultivated in many countries for its seeds and whole herb as a salad crop. It is an aromatic herb and also used as a medicine in many folklore. It is believed to be native of Europe and Western Asia but cultivated in many countries now a day (Anonymous, 2007).

2. GEOGRAPHICAL DISTRIBUTION

Tukhm-e-Karafs is globally distributed in Abyssinia, Afghanistan, Europe, Western Asia, and North Africa, Persia. In India it is found in various regions like Western India, North West Himalaya, Western Himalayas, Himachal Pradesh, Uttar Pradesh, Western Uttar Pradesh, Outlying Hills in the Punjab, Bengal, Bombay and Hills of Utrakhand (Kirtikar, 1995; Kokate 2017; Dymock Warden, Hooper 1891; Anonymous, 2007;

Nadkarni, 2000; Dymock et al., 1891; Anonymous, 2015; Ghani, 2011; Pulliaiah, 2006; Anonymous, 1950).

3. SELECTED VERNACULAR NAMES

Arabic	Habb-ul- <i>Karafs</i> , Samarul <i>Karafs</i> , <i>Karafs</i> , <i>Tukhm-e-Karafs</i> , Fitra Saliyun
English	Celery, Marsh Parsley, Smallage, Wild celery, <i>Apium</i>
French	Api, Apibausguas, Ache, Ache Cultivee
German	Eppich, Sellerie, Sumpfpöppich, Wassereppich, Wassermark, Wasserpeterlein, Wildersellerie
Italian	Appio, Sedano
Persian	<i>Tukhm-e-Karafs</i> , <i>Karafs</i> , <i>Karafsh</i> , <i>Karab</i> , <i>Tukhm-e-Karab</i> , <i>Karafs</i> kohi
Russian	Dikiy Selderei
Spanish	Apio, Apiocomun
Unani	<i>Karafs</i> , Saalyun
Hindi	<i>Karafs</i> , Ajmod, Ajmad, Bari Ajmod, Ajmod, Boriajmod, Ajmoda
Sanskrit	Ajmoda, Andha Patriki, Brahmakoshi, Dipyaka, Gandhadala, Mayura, Shikkimoda, Uragandha, Vastamoda, Vishali
Urdu	<i>Tukhm-e-Karafs</i> , Ajmod

(Anonymous, 2007; Nabi, 2007; Kirtikar, 1995; Dymock et al., 1891; Nasir et al., 1860; Hakim, 2002; Ibne-Baytar, 2003; Nadkarni, 2000; Pulliaiah, 2006).

4. DESCRIPTION

The seeds (fruits) of *Tukhm-e-Karafs* (*Apium graveolens* L.) are

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mostly separated mericarp. The cremocarp is brown ovoid, laterally compressed. Each mericarp has five straight, scarcely prominent primary ridges. Seeds are branched, circular, blackish in colour, Irregular surface, strong odour, pungent in taste, resembles *Zeera* (caraway). Stem is cylindrical occasionally branched, succulent, nodes are distinct and swollen, show well developed scaly leaves clasping the bases of the lateral branches, surface is longitudinally ridged and furrowed; colour yellowish green, Odour faintly aromatic; taste salty. Leaf is pinnate, large, 3 partite, with large deeply lobed segments and coarsely toothed at the apex, pale green in colour, Odour aromatic; taste salty and slightly bitter. Flowers are inflorescence which is a compound umbel with short peduncle. The flowers are small and white in colour. Its root is cylindrical tap root longitudinally started, odour aromatic, and taste salty (Anonymous, 2007; Ghani, 2011; Pulliaiah, 2006). According to Unani scholar the colour of the flower is *zard* (yellowish) and has thin branches. According to Unani scholar root is blackish and has fibrous branches and is considered as most powerful among all parts of *Karafs* (Ghani, 2011).

5. TUKHM-E-KARAFS (*APIUM GRAVEOLENS* L.) IN UNANI SYSTEM OF MEDICINES

The *Mijāz* (temperament) of *Tukhm-e-Karafs* is *Hārr Yabis* (Hot² & Dry²) or *Hārr Yabis* (Hot¹ & Dry²) (Anonymous 2007, Nabi 2007, Ghani 2011, Hakim 2002, Ibn Baytar 2003, Ibn Sina 1998). According to *Jalinus* (Galen), *Karafs* (*Apium graveolens* L.) and *Kahu* (*Lactuca serriola* L.) when mixed then *Mizāj* (temperament) of the product becomes *Mu'tadil* (moderate) (Ibne-Baytar, 2003). *Miqdār-i Khurak* (dose) of *Tukhm-e-Karafs* as mentioned in literature is 3-5 gm and 6 gm (Ghani, 2011; Nabi, 2007; Anonymous, 2007; Nasir et al., 1860). The *Muzir* (side effects) of *Tukhm-e-Karafs* is *Suda* (Headache) especially in people having *Hārr Mijāz* (hot temperament). It produces adverse effects in pregnancy, epilepsy and hot temperament people so may be avoided in these conditions (Nasir et al. 1860, Ahmed et al. 2015). The *Muslih* (corrective) is used to reduce adverse effects or to improve efficacy of the drug. *Anisoon* (*Pimpinella anisum* L.), *Ajwain Khurasani* (*Hyoscyamus niger* L.), *Mastagi Rumi* (*Pistacia lentiscus* L.), *Kahu* (*Lactuca serriola* L.) and *Gulqand* are generally used as corrective to the adverse effects of the *Karafs* (Ghani, 2011; Hakim, 2002; Nasir et al., 1860; Nabi, 2007). The *Badal* (substitute) of *Karafs* in conditions where it is not available is required. The substitute for whole herb is whole herb of *Badiyan* (*Foeniculum vulgare* Gaertn.) and for seeds substitute are seeds of *Ajwain Desi* (*Trachyspermum ammi* L.) and *Zeera* (*Cuminum cyminum* L.). The shelf life (*Muddat-i-Hayāt*) of *Tukhm* (seed) is about 2 years and for its roots 3 years (Ghani, 2011).

5.1 Therapeutic actions (*Afa'al*) of *Tukhm-e-Karafs* (*Apium graveolens* L.)

Mudirr-i-Bawl (Diuretic), *Mushtahī* (Appetizer), *Mudirr-i-Hayd* (Emmenagogue), *Mufattit-i-Hasāh* (Lithotriptic), *Kāsir-i-Riyāh* (Carminative), *Mufattih-i-Sudad* (Remove obstruction), *Mu'arriq* (Diaphoretic), *Muqawwi-i-Bāh* (Aphrodisiac), *Muhallil* (Resolvent), *Musakkin-i-Dimāgh* (Sedative), *Mulayyin-i-Am'ā'* (Laxative), *Qātil-i-Dīdān* (Anthelmintic), *Mukhrīj-i-Janīn* (abortifacient), *Muqawwī* (Tonic), *Dafi'-i-Tashannuj* (Antispasmodic), *Mugharrī*, *Dafi'-i-Magh*s (Antitenesmus), *Musakkin-i-Suda* (Relieve Headache) and Beneficial in ophthalmic disease (Anonymous, 2007; Ghani, 2011; Azam, 2012; Nasir et al., 1860; Nabi, 2007; Kirtikar, 1995; Nadkarni, 2000; Hakim, 2002; Ibn Sina, 1998; Ibne-Baytar, 2003;

Kabiruddin,2000).

Karafs is beneficial in management of *Waja'al-Kulya* (renal pain), *Waja'al-Mathana* (Pain in bladder) and *Waja'al-Zahr* (Backache) as described by Dioscorides. According to *Masīh*, it resolves obstruction in cavity of liver and spleen. It helps in healing wound that have morbid matter. Razi suggested that in hot temperament individuals, vinegar is to be added with *Karafs* before using it. Israyli said that when *Kahu* is used with *Karafs*, it act as corrective to *Karafs* and neutralize its taste. *Karafs* is *musakkin* (neutralize the heat of humours) and helps in starting menstruation or diuresis of urine. According to *Jalinus* (Galen) *Karafs* removes *Nafkh al-Mi'da* (flatulence) due to accumulation of *Rīh* (gases), its seeds have more beneficial actions as compared to others parts of the plant. The potent calorific actions of *Karafs* result in increment of flow of urine and menses. *Karafs* in powder form is more effective if given with honey (Ibne-Baytar, 2003). It removes *Th'alil* (warts) if applied with *Naushadar* (ammonium chloride). *Karafs* increase appetite if given with common salt (Ghani, 2011). In Ayurveda, its actions and uses are described as Stomachic, bronchitis, ascites and toothache. The powder of seeds is used for treatment of diarrhoea, dysentery, hoarseness of voice, indigestion and loss of appetite and impurity of breast-milk caused by *vata* (Kirtikar, 1995).

5.2 Therapeutic Uses of *Tukhm-e-Karafs* (*Apium graveolens* L.)

Hasah al-Kulya (nephrolithiasis), *Hasāh al-Mathāna* (cystolithiasis), *Dīq al-Nafas* (bronchial asthma), *Niqris* (gout), *'Irq al-Nasā* (sciatica), *Waja'al-Zahr* (backache), *Dhāt al-Janb* (pleurisy), *Istisqā'* (oedema), *Nafkh al-Mi'da* (flatulence), *Hudūr* (rheumatism), *Ihtibās al-Bawl* (retention of urine), *Waja'al-Kulya* (renal pain), *Waja'al-Mathāna* (cystodynia), *Qay'* (vomiting), *Maghs* (tenesmus) and *Suda* (headache). If leaves of *Karafs* used with common salt it is effective in Diarrhoea. (Anonymous, 2007; Ghani, 2011; Azam, 2012, Nasir et al., 1860; Nabi, 2007; Kirtikar, 1995; Nadkarni, 2000; Hakim, 2002; Ibn Sina, 1998; Ibne-Baytar, 2003; Kabiruddin, 2000).

5.3 Compound formulations containing *Tukhm-e-Karafs* (*Apium graveolens* L.) as an ingredient:

In Unani Medicine, drugs from plant, mineral and animal origin have been used either as single entity or in combination of more than one drug in specific proportion mentioned in Unani Pharmacopoeias and National formularies. If more than one drug has been mixed in specific proportion and method then it is called compound formulation. The following compound formulations contain *Tukhm-e-Karafs* (*Apium graveolens* L.) as an ingredient in it. The actions of the formulation and their therapeutic effects are also mentioned with each:

- *Shiyaf-i-Kundur* has *Mujaffif* (desiccant) action and used to treat *Buthūr-i-Chashm* (eye eruptions).
- *Banadiq-ul-Buzoor* has *Musakkin* (sedative), *Mudirr-i-Bawl* (diuretic) and *Mudammil* (healing agent) actions and used to treat *Qurūh al-Kulya* (ulcer of kidney), *Qurūh al-Mathāna* (ulcer of bladder) and *Hurqa al-Bawl* (burning micturition).
- *Jawarish-i-Falafīli* has *Muharrik Rutūbat Mi'da* (Gastric juice stimulant), *Mulayyin* (Laxative), action and used to treat *Qabz* (constipation), *Sū' al-Hādm* (dyspepsia) and *Waja'al-Mi'da* (gastralgia).
- *Jawarish-i-Safarjali* has *Qabiz*, *Muqawwī-i-Mi'da* (stomachic), *Hābis* (hemostyptic), *Dafi'-i-Qay'* (antiemetics), *Hādim* (digestive) actions and used to treat *Du'f al-Mi'da* (weakness of stomach), *Ishāl* (diarrhoea) and *Qay'* (vomiting).

- *Jawarish-i-Shahreyaran* has *Mulayyin* (laxative) and *Mufattih-i-Sudad* (remove obstruction) actions and used to treat *Qabz* (constipation), *Qūlanj* (colic), *Istisqā'* (oedema), *Du'f al-Kabid* (hepatic insufficiency) and *Du'f al-Mi'da* (weakness of stomach).
- *Jawarish-i-Zarooni Sada* has *Mudirr-i-Bawl* (diuretic), *Mufattih-i-Hasāh* (lithotriptic) and *Kāsir-i-Riyāh* (carminative) action and used to treat *Du'f al-e Kulya* (renal Insufficiency), *Hasāh al-Mathāna* (bladder Stone), *Hasah al-Kulya* (renal Stone), *Waja'al-qutn* (backache) and *Waja'al-Kulya* (renal pain).
- *Majoon Dabeed-ul-Ward* has *Mudirr-i-Bawl* (diuretic), *Muhallil Waram* (anti-inflammatory) and *Muwallid-i-dam* (haemopoietic) action and used to treat *Istisqā'* (oedema), *Waram al-Kabid* (hepatitis), *Du'f al-Kabid* (hepatic insufficiency), *Waram al-Rahim* (uterine swelling), and *Faqr al-dam* (anaemia).
- *Majoon-i-Hajr-ul-Yahood* has *Mudirr-i-Bawl* (diuretic) and *Mufattih-i-Hasāh* (lithotriptic) action and used to treat *Hasah al-Kulya* (renal Stone), *Hasāh al-Mathāna* (bladder Stone), *Hurqa al-Bawl* (burning micturition) and *Qilla al-Bawl* (oliguria).
- *Majoon-i-Jalali* has *Muqawwī -i-A'sāb* (nervine tonic), *Muqawwī -i-A'dā' Ra'isa* (tonic to vital organs), *Muwallid-i-Manī* (spermatogenic) action and used to treat *Du'f al-ishthihā'* (anorexia), *Du'f al-Kulya* (renal insufficiency), *Du'f al-bāh* (anaphrodisia), *Du'f al-Mi'da* (weakness of stomach), *Qilla al-Mani* (oligospermia) and *Du'f al-A'dā' Ra'isa* (weakness of vital organ).
- *Majoon-i-Jograj Gugal* has *Muhallil Waram* (anti-inflammatory), *Muqawwī -i-A'sāb* (nervine tonic), *Mulayyin* (laxative) action and used to treat *Fālij* (hemiplegia), *Ra'sha* (tremor), *Laqwa* (facial palsy), *Du'f al-A'sāb* (nervine weakness), *Waja'al-Mafāsīl* (polyarthritits), *Bawāsīr Dāmiya* (bleeding Piles) and *Waram al-Mafāsīl* (rheumatism).
- *Majoon-i-Kalkalanaj* has *Muhallil Waram* (anti-inflammatory), *Mudirr-i-Bawl* (diuretic) and *Mufattih-i-Sudad* (deobstruent) actions and used to treat *Hummā* (fever), *Istisqā'* (ascites), *Qūlanj* (colic), *Dīq al-Nafas* (bronchial asthma) and *Ikhtināq al-Rahim* (hysteria).
- *Sikanjabeen Buzoori Motadil* has *Mundij* (concoctive) and *Mulayyin* (laxative) actions and used to treat *Hummā* (fever), *Nazla* (coryza), *Su'āl* (cough) and *Qabz* (constipation).
- *Sufoof-i-Namak Sheikh-ur-Raees* has *Hādīm* (digestive) and *Kāsir-i-Riyāh* (carminative) actions and used to treat *Du'f al-Hadm* (delayed digestion), *Nafkh Shikam* (flatulence) and *Ghathayān* (nausea).

6. CHEMICAL CONSTITUENTS OF TUKHM-E-KARAFS (*APIUM GRAVEOLENS* L.)

Tukhm-e-Karafs contain *Apiin* a glycoside, this glycoside split up into glucose and *Apigenin*. *Apigenin* is isomeric with quinone. The seeds and herb yield a colourless or pale yellow essential oil. The other chemical constituents found in *Karafs* are *Apiin*, luteolin, apigenin, isoquercitrin, bergapten, myristic acid, chrysoeriol, apiosylglucoside, *p*-coumaric and ferulic acids, kaempferol, celereoside, apigravin, psoralen, umbelliferone, apiumetin, rutaretin carvone, piperitone, eugenol, α -pinene, terpinolene, menthone, β -carotene, vitamin A palmitate, vitamin

K₁, α -tocopherol, L-3-n-butylphthalide, DL-3-n-butylphthalide, N-butylphthalide, caryophyllene, butylphthalide, β -sitosterol, and myrcene (Dymock, Warden, Hooper, 1891; Anonymous, 2015).

7. PHYSICOCHEMICAL STANDARDS OF TUKHM-E-KARAFS (*APIUM GRAVEOLENS* L.)

Physicochemical standards of a drug ascertain the quality of the drug because the therapeutic actions depend upon the secondary metabolites and chemical constituents of the drug. The variation in the standards may result in disparity in the therapeutic actions. To avoid batch to batch variation and to get desired therapeutic effect at specified dose the standards should be checked in the crude drug before using it. The checking of standards is necessary whether drug is used as single entity or as an ingredient in the compound formulation. The following standards has been laid down for its quality check:

- Foreign organic matter: Not more than 1%
- Ash: Not more than 10%
- Acid insoluble ash: Not more than 2%
- Volatile oil: Not less than 1.5%
- Specific gravity: 0.870 to 0.895
- Optical rotation: +67° to +79°
- Moisture: 5 - 11% (seeds), 80.3-93.5% (leaves),
- Total ash: 6.9 - 11.0% (seeds)
- Fibers: 1.4 - 10.2% (seeds)
- Cold water extract: 5.9 - 12.9 % (seeds) (Fazal & Singla, 2012; Al-Snafi, 2014).

8. PHARMACOLOGICAL ACTIVITIES OF KARAFS (*APIUM GRAVEOLENS*)

Various pharmacological activities have been studied in animal studies and it has shown very promising results. Some important studies and findings are given below:

Aqueous and Hexane extracts of seeds has shown anti-inflammatory activity (Momin R, 2002), its seed as a whole have demonstrated analgesic activity (Ahmed et al., 2015). Hydro-alcoholic extract of whole plant confirmed increase in spermatogenesis (Kooti et al., 2014). It has revealed anticancer effects when crude extract of plant is used (Varadharajan et al., 2011). Methanolic extract of seeds has shown antidepressant activity (Desu & Sivaramakrishna, 2012). Antihypertensive activity has been revealed by whole plant extract (Jorge et al., 2013) and hydro-alcoholic extract of whole plant and ethanolic extract of seeds has shown antihyperlipidemic activity (Wesam Kooti et al., 2014; Ahmed & Sayedda, 2012). Aqueous and Ethanol extract of leaves has shown spasmolytic activity (Suzana et al., 2015) while Methanolic extract of whole plant anti-Parkinson activity (Chonpathompikunlert et al., 2018). Hydro-alcoholic extract of seeds has revealed beneficial effects on Infection of kidney and bladder (UTI) (Sarshar et al., 2018). Gastric antiulcer, antisecretory and cytoprotective activity was demonstrated by its ethanol extract of aerial part of fresh herb (Al-Howiriny et al., 2010). Anti hyperuricemic activity has shown by hydro-alcoholic extract of whole plant (Dolatī et al., 2018). Antihyperlipidemic and antitumor activity by ethanolic extract of seeds (Iyer D & Patil, 2019) and antidepressant and cognitive function improving activity by its Crude drug extract of whole plant was revealed (Boonruamkaew et al., 2017). Methanolic and aqueous extract of aerial part of herb has confirmed anti-ulcerogenic and antibacterial activities

(Baananou et al., 2013). Methanolic extract of seeds has shown anti hepato-carcinogenesis activity (Sultana et al., 2005) while Methanolic extract of seeds has shown hepatoprotective activity (Singh & Handa, 1995). Crude seed extract has revealed antimosquito potential (Choochote et al., 2004).

Table 1. Pharmacological activities of Butylphthalide (a chemical constituent) obtained from *Apium graveolens L.*

S. No.	Action/Disease	Form	References
1	Alzheimer's disease	L-3-n-butylphthalide	Yu Zhang et al. 2016 & Xiang et al. 2014
2	Parkinson's disease	DL-3-n-butylphthalide	ZHOU et al. 2019
3	Chronic epilepsy	L-3-n-butylphthalide	Ye et al. 2018, Zhang et al. 2017
4	Protective effect on the neurotoxicity	L-3-n-butylphthalide	Yang et al. 2017
5	Progressive cerebral infarction	DL-3n-butylphthalide	Zhang et al. 2017
6	Antifungal	N-butylphthalide	Gong et al. 2019

9. CONCLUSION

Karafs (Apium graveolens) is an important and useful drug of the Unani system, it has variety of actions and used as a single entity or with other drugs in compound formulation. It has Hot and dry temperament and as per Unani philosophy it can be used for diseases of cold temperament. It is successfully investigated for its action and uses in kidney diseases like, nephroprotective activity, diuretic activity, lithotriptic activity etc. in animal models. It has several bioactive secondary metabolites which are responsible for its various actions. As Unani system believes in holism and whole body is treated as a unit in case of any disease so it has been used in its crude form. Its antihypertensive activity may be due to its diuretic activity. It's anticancer, antitumor and cytoprotective activities suggest that it can be used successfully in treatment of carcinoma without destroying normal healthy cells. Antiparkinson, antidepressant and memory improving activity suggests its possible therapeutic use in depression, insomnia, amnesia and alzheimer disease. Its anti-inflammatory and antimicrobial activities suggest its use in infectious diseases and fevers. Due to its proven antihyperlipidemic activity it can be used in obesity, polycystic ovarian syndrome and many cardiac problems.

According to Unani literature, it may be used to treat backache, bronchial asthma, cystolithiasis, flatulence, gout, headache, nephrolithiasis, oedema, pleurisy, renal pain, retention of urine, rheumatism, sciatica, tenesmus and vomiting as a single drug. The modern work on its activity on respiratory system to treat bronchial asthma, pleurisy may be explored on animal model to validate Unani claim. Its action on joint pains and rheumatism may also be explored by animal studies. The validated claims in animal studies may be further authenticated by clinical trials or studies to confirm it. The pharmacological activities depends upon various phytochemical in plants but In Unani, whole plant or its part or its product is used in natural form because body can digest, metabolize and retain natural ingredients easily without producing adverse effects. The natural drugs have some micronutrients also and these may be helpful to replenish the deficiency of these nutrients. The natural drugs also

have some ingredients which may provide some energy to the tissue and body during the digestion process. It also helps body to improve immunity and to fight the disease properly. The phytochemicals may be explored and tested for different actions produced by each constituent to validate the Unani claims of its action but it should be used as a whole in natural form to avoid adverse effects.

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CONFLICT OF INTEREST

Authors have no conflict of interest to declare.

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