



Review Article

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AN OVERVIEW OF *KARAFS (APIUMGRAVEOLENS, LINN)*: IT'S ETHNOBOTANICAL, PHYTOCHEMICAL AS WELL ASPHARMACOLOGICAL IMPORTANCE

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Abstract

Apiumgraveolens (Karafs) is an annual or biannual branching plant about 1mt in height found in the mountainous areas of the tropics. The plant produces seeds only in second years but in the very first year in plain areas. In Unani classical literatures it has been described of many types such as *Bustani*, *Jabali*, *Sakhri*, *Mashriqi*, *QabrisiAjami*, *Barni*, *Mai (Tari)* and *Nabti*. Generally the root of Karafs is known as *Bekh-e-Karafs* and seeds are called as *Tukhm-e-Karafs*. Both the forms are used in Unani system of medicine for many pathological conditions especially in obstruction and inflammation of visceral organs like liver, spleen, intestine and uterus etc. It has a number of active chemical constituents such as 23 % Apiin, glucoside, Apigenin, essential oil, *Apiol*, or *parsley camphor*, volatile oil. The essential oil of Karafs has been reported for its Central depressant activity, anthelmintic activity and antimicrobial activity.

Keywords: *Apiumgraveolens*; biannual; obstruction and inflammation, visceral organs anthelmintic activity;

INTRODUCTION

Karafs is an herbaceous plant, having 250 genera^[1] belongs to the *Umbelliferae* family and about 30000 species have been recorded in the world from sources, cultivation as well as wild^[2, 3, 4]. The ancient Hindus did not know about Celery (Karafs). The Arabians got knowledge of it from Greeks. According to Dioscorides Karafs is of five types. Sprengel refers two of these to *Apiumgraveolens* var. *Sativum* ET *sylvestre*. The selinon of Theophrastus is expected to be Celery. He also refers Eleioselinon, Hipposelinon, and Oreoselinon. In India about 120 years ago Muhammad Husain described that Karafs is the Celery the Europeans and the *Udasaliyun* of Greeks. He describes three other types i.e. Sakhri, in Greek *Fitralsaliyun*, Nabti, in Greek *Akusaliyun* and Tari, in Greek *Shamariniyun*. Alwazi describes it as "silna"^[5, 6, 7]

Vernacular Names

Unani-Karafsawasaliyun^[8]

Arabic-Karafs^[5, 9, 10]Tukhm-e-Karafs^[11]Bazr-ul-Karafs^[12, 13]Habb-ul-Karafs^[14]

Persian-Tukhm-e-Karafs^[12]Tukhm-e-Karasb^[10, 11]Karafs^[8, 14, 13]

Urdu-Ajmod^[10, 15]

English- Celery ^[5, 12, 16, 10, 15, 9, 17]Celery Seeds^[18, 19, 13]

Hindi-Ajmod^[5, 12, 10, 8, 20, 11, 21, 17, 13, 22]Sharari^[16] Ajmoda^[17, 18, 9]Ajmod^[21, 16]

Distribution



Fig. 1 Plant of *Apiumgraveolens***Fig. 2** Seeds *Apiumgraveolens*

Ajmod is found in North-West Himalayas and outlying hills in the Punjab and U.P.^[10, 15, 21, 17, 18, 23, 9, 24, 1, and 2]Persia and throughout temperate regions of North, South Africa

and in Europe and America. Ajmod is cultivated as a salad plant and for seeds at large scale. It grows better in moist and cold climate. In recent years Ajmod is cultivated in the Punjab and Uttar Pradesh for export of its seeds to America. The yield of seeds is about 300-550Kg per acre [3, 25, 5, 2, 18, 26, 10, 21, 27, and 16]

Unani Description (*Mahiyat*)

Karafs is described of many types like Bustani, Jabali, Sakhri, Mashriqi, QabrisiAjami, Barni, Mai (Tari) and Nabti[28, 29, 30, 31, 8, 32, 33, 34, 7, 9]. Al-Beruni says that the people of TirmidhKhatl, and Bukharistan called Karafs as "Sumbul"[35, 36]. Karafs-e-Sakhri is called *Fitrasaliyun* while Karafs-e-Barri is called "*Samarniyun*"[28, 29, 6, 30, 8, 31, 35, 5, 32, and 36]. According to Dioscorides Wild varieties (Jabli and Sakhri) have other some sub-varieties one of them is similar to garlic bud and other has rose like bud. Samarniyun grows near water (Tari, Maice) it is larger than the cultivated (Bustani) and has a milky white colour, having a hollow stem and it is more potent than the cultivated variety. The Karafs-e-Jabli is more pungent. The seeds of Karafs is resemble to Ajowain but its smell is stronger[29, 6, 31, and 19]. Generally the root of Karafs is known as *Bekh-e-Karafs* and fruit is called as *Tukhm-e-Karafs*. Both are used in Tibb-e-Unani. The leaves are roundish having many lobes with toothed margin. The height of plant is about one yard, yellow flowers, round & small fruit black and dull in colour, acrid in taste, aromatic odour, large black roots having fibres[29, 8, 36, 11, 7]. According to Ghani (1921) the flowers of Karafs are white and flowers and seeds are arranged as an umbrella. Taste is pungent slightly mint like [32].

Ethanobotanical Description

Apiumgraveolens Linn is an annual or biannual branching plant about 1mt in height found in the mountainous areas of the tropics. The plant produces seeds only in second years but in the very first year in plain areas. The crop is ready by November or December. The Stems measure about .3-2.4 meter in length leaves or radical, pinnate, with large deeply lobed segments and leaves are similar to the leaves of coriander. The length of peduncles 6mm or less. The fruits are small about 1-2mm long and 1mm in diameter and contain a minute seed inside the fruit. The fruits are ovate or globular, hairy surface, slightly tubercled, marked with prominent ridges, greenish yellow or brown. The taste is aromatic some what pungent. The odour like anise but faint. The vittae of fruit are 11-12/6-9 in number; two of these are on the commissural side. The

epicarps are interspersed with oil ducts^[5, 27, 2, 12, 4, 26, 25, 10, 17, 23, and 37]. The roots are dry in short pieces, dark brown in colour and covered by bundle of five greyish brown fibres which looks like a tail. The diagnostic microscopical characters are usually found in the root is periderm consisting of 8-10 layers of cork cells. These layers are in the outer cortex. The cork cells possess brown colouring matter. The medullary rays are generally 1-3 serrate. The vessels are mostly with spiral or reticulate thickening^[16]

Temperament (*Mizaj*)

In Unani system of medicine the action of any drug depends on its temperament. There are four types of temperament mentioned in the classical literature of Unani medicine namely Hot-Dry, Hot-Wet, Cold-Dry and Cold-Wet. The following temperament of *Apiumgraveolens* are written in a length of Unani book.

Hot^I Dry^I ^[34, 13, 36]

Hot^I Dry^{II} ^[33, 38, and 20]

Hot^{II} Dry^{II} ^[29, 8, 19, 32, 30, 11, 16, 9, 7]

Hot^{III} Dry^{III} ^[28, 29]

Hot^{III} Dry^{II} ^[31]

Therapeutic Actions (*Afa'al*)

Karafs (*Apiumgraveolens*) is an important drug of Unani Medicine and it has following medicinal properties.

Deobstruent (*Mufattah-e-Sudad*)^[5, 18, 12] **Resolvent** (*Muhallil*)^[5, 18, 12] **Pectoral Tonic** (Liver/Stomach/Cardial Tonic (*Muqawwi-e-JigarMeda, -wa-Qalb*)^[32, 39, 15] **Carminative** (*Kasir-e-Reyah*)^[15, 19] **Purgative** (*Mushil*)^[13, 25, 18, 10] **Diuretic** (*Mudirr-e-baul*)-**Emmenagogue** (*Mudirr-e-tams*)^[28, 11, 15, 7, 19, 9] **Lithotriptic** (*Mufattit-e-hisat*)^[5, 18] **Alexipharmic** (*Tiryaq-e-Zahar*)^[28, 5, 18] **Febrifuge** (*Daafa-e-humma*)^[7, 5] **Anti-Asthmatic** (*Dafa-e-Zeequnnafas*)^[28, 11, 19, 18] **Stimulant** (*Muharrik*)^[15, 18, 4] **Anti-Septic** (*Dafa-e-taaffun*)^[17, 23] **Anti-Spasmodic** (*Dafa-e-tashannuj*)^[15, 17, 23, 10, 18, 4] **Aphrodisiac** (*Muharrik-e-Ba'ah*)^[10] **Abortifacient** (*Mukhrij-e-mashima*)^[28, 11, 19, 7, 23, 10] **Anodyne** (*Musakkin-e-alam*)^[29, 28, 33, 7, 32, 38] **Diaphoretic** (*Muarriq*)^[29, 19, 7, 32, 16] **Anti-Oxidant** (*Mana-e-Mukassid*)^[40]

Therapeutic uses (*Istemala'at*)

Apium gr. is frequently used Unani medicine in following diseases since ancient time.

Liver and splenic diseases (*Amra-e-Jigar wa Tehaal*)^[17, 23, 10, 18] -**Adjuvent to purgative**(*Ishaal men Izaafekeliye*)^[5, 18, 12]-**Constipation and Flatulence** (*Qabzaur Nafkha*)^[13, 12] -**Swollen glands** (*Warm-e-Ghudad*) (Poultice)^[28, 32, 12]–**Ophthalmia** (*Amraz-e-Chashm*)^[14, 32, 10, 18]–**Vomiting** (*Qai*)^[14, 28, 8, 11, 32, 19, 10] -**Heart Disease** (*Amraz-e-Qalb*)^[10] -**Urinary passage infection** (*Ta'adiya Majrayebaul*)^[32, 38, 9]–**Bronchitis** (*Warm-e-Sha'ab*)^[11, 34, 15] -**Chest Pain** (*Wajau-s-Sadr*)^[18, 10] -**Fever with cough** (*Hummaur Suaal*)^[12, 10]–**Rheumatism** (*Wajui- mafasil*)^[11, 15, 19]–**Asthma** (*Zeequn- Nafas*)^[11, 34, 15, 7] -**Difficulties in Breathing** (*Tangiy-e-Tanaffus*)^[34] b-**Inflammation of stomach** (*Warm-e-meda*)^[7, 10] -**Loss of Appetite** (*Zoaf-e-ishteha*)^[10]–**Hiccup** (*Fowaq*)^[18, 23, 10] -**Dropsy and Colitis** (*Tukhma wa Qaulanj*)^[41] -**Sciatica**(*Arqu-un-nisa*)^[23, 17, 18, 10]–**Toothache** (*Wajul-asnaan*)^[10] -**Renal and Bladder Colic** (*Wajwul Killiyah wa Masanah*)^[7, 39, 14, 25, 10]–**Gout** (*Neqras*)^[32, 19, 11, 18, 17, 37]–**Dysmenorrhoea**(*Usr-e-Tams*)^[32, 19, 10] -**Cracking of nail** (*Insheqaq-e-Nakhoon*)^[28] –**Pleurisy** (*Zaat-ul-janb*)^[19] -**Jaundice**(*Yarqaan*)^[34, 25]–**Livido** (*Zoaf-e-baah*)^[28, 32]–**Ascitis** (*Istisqa'a*)^[38, 33, 10]–**Colic** (*Waja*)^[7, 15, 23, 17]–**Cough** (*Sua'al*)^[38, 33, 7, 9]–**Dysurea** (*Usr-e-baul*)^[38, 33, 34] -**Skin disease** (*Amraz-e-Jild*)^[28, 11, 7, 2]–**Scabies** (*Kharish*)^[28, 34, 32, 11, 10]–**Pruritis** (*Hikkah*)^[28, 34, 11] -**Warts and Lantigo**^[34]–**Alopecia** (*Sa'afah*)^[28, 19, 32, 11]–**Boils** (*Zakhm*)^[7]–**Psoriasis** (*Da'a-ul-Sadaf*)^[2] -**Labour Pain** (*Dard-e-Zeh*)^[28, 34] -**For xpulsion of baby and Placenta** (*Janeen wa masheemakeikhrajkelie*)^[28, 32, 29] -**Brain and Nerve**(*Amraz-e-Asaab wa Demagh*)^[18] -**Menstrual flow** (*Qillat-e-Tms*)^[28, 11, 8, 31, 27, 23]

Dose (*Miqdar-e-Khorak*)

In different Unani as well as ethanobotanical literatures the dose of Apium gr is mentioned as follows:

Seeds 2.5-3 gm ^[32]
 3-5 gm ^[9, 19]
 5-30 grains ^[12]
 1.5 Misqal ^[22]

Roots 5-7 gm [16, 9]

Syrup 1 Derham [34]

Advers effect (*Muzir*)

This drug may produces harmful effects also in following condition.

For epileptic patient[20, 19]

Produces headache[5, 34]

For breast feeding mother/pregnant [29, 28, 20, 32, 9, 38, 11, 5]

For lungs[34]

Corrective (*Musleh*)

Following correctives may be used if any advers reaction arises after using Apium gr.

Kahool[28, 11, 22]

Pimpinellaanisum (Anisoon) Mastagi (Pistacialentiscus)[11, 32, 9, 16]

Hammam, Hindba, Vinegar[34]

Substitute (*Badal*)

In absence or non availabilityof the drug followingsabstituescan be used as they are mentionedin a length of Classical Unani literatures.

Raziyanaj (*F. Vulgare*)[22, 32]

Majoon-e-gul -wa-Mastagi[28, 22]

Ajwain (*Ptycotisajowan*)[16, 32, 34, 11, 9]

Kamoon[34, 19]

Phytochemistry

Seeds contain 23 %Apiin ($C_{12}H_{14}O_7$)[23, 37] which gave by analysis 54.71-55.25% carbon and 5.49-5.60 hydrogen. Further it is observed that it is a glucoside, which is made up of glucose and Apigenin (66.13%, carbon and 3.9% Hydrogen). In recent analysis shown that apiin is giving 53.55% Carbon and 5.36% Hydrogen and agigenin, 65.12-66.21 Carbon and 3.75-3.91 Hydrogen. Apiin is a jelly like substance, which is easily soluble in

hot water and more easily in hot alcohol, but in cold water slightly soluble, and in either insoluble; in alkalis it gives light yellow colour. The seeds also contain a pale yellow essential oil, *Apiol*, or *parsley camphor*, volatile oil, (2.3%) protein, fixed oil and mucilage^[3,12, 42, 5, 2, 18, 26, 23, 15, 19, 37]. In Karafs seeds, apiol, sedanolide, 3-butylphalide and d-limonene, d-selenene, selanoic acid anhydride, sedanolide, a glucoside and apiin are present^[25]. According to Farooq(1956)^[43] Celery seed oil is greenish colour, Sp.Gravity (25°) 0.9282, saponification value, 193.2, Iodine value, 90.0, Fatty acids 7.0 , d-Limonene 50%, selinine 7%, terpeneol 5.6%, santalol 4.6% and a new acid 3.5%. In an earlier investigation d-Limonene, 60% d-selinene 10%, sedanolide 2.5-3.0% was found^[44, 17, 23, 37] d-Limonene 44%, salinene, 23%^[43, 2] Physicochemical constants, loss on drying at 100°, 8.70%, total ash, 6.50%, essential oil, .85% protein, 13.18% fibrous material, 17.42%^[45]. The seeds are reported to yield 2 new glycosides-graviobioside-AS and B^[17]. Two more fatty acids are reported by GLC method namely, stearic and linolenic acids^[46]. Karafs has different values of volatile oil at different stages, during flowering it has more oil, 1.70% and major constituent is isolated by TLC is limonene^[47] Essential oil, 3% in which limonene 37%, beta selenene, 28.5%, Lipids, 19.93%, proteins, 19.75%, carbohydrates, 31.86%^[48]. The chemical composition of Karafs found in Rohilkhand region is, acid value, 3.2% Ester value, 16.9%, Ketonic, 27.5% ^[49, 17]. In the young root of Karafs the presence of tartaric acid, malic, citric, isocitric, succinic and fumaric acids is reported^[50]. Karafs has glycosides, steroids, phenolics, and tannin as organic substances, while its inorganic substances are, sodium, potassium, calcium and iron, pH value of 1% solution (5.00), and of 10 % solution (4.17), total ash (9.25-9.75%), acidinsoluble ash (4.75%), water soluble ash (1%), loss of weight on drying (6.15%), the extractive values as, in Pet. ether (3.18%), in Benzene (7.62%), in Chloroform (2.4%), in Acetone (1.8%) and in Alcohol (65.5%), total Phenolics (3.50%), and Tannins (0.98%)^[16]. According to Asif *et al.*, 1984;^[51] the physico-chemical constants are as, total ash (7.26%), acidinsoluble ash (2.69%), water soluble ash (2.86%), the extractive values as, in Pet. ether (5.38%), in Benzene (8.78%), in Alcohol (4.16), and in water (15.96%), the moisture contents (8.0% w/v), as quantitative analysis the Nitrogen (2.58%), Proteins (16.13%), Sugars (2.69%), Sterols (4.78%), oil contents (5.38%), Saponification value (188.6), Iodine value (147.9).

Pharmacological Activity

The effect of essential oil of Karafs on central nervous system and ED₅₀ values are experimentally observed, it has found that Karafs possesses tranquilizing effects in mice [52, 17]. The Alkaloid fraction of seeds also has tranquilizing activity in animals [51, 53, 17]. Central depressant activity of essential oil of Karafs having sedanenolides is reported [54]. Essential oil of Karafs seed has anthelmintic activity it is proved by experiment [55, 51]. Antibacterial effect of essential oil is also reported [56, 17]. The effect of oil against several bacteria and fungi has reported and it is found that oil has better antibacterial activity than antifungal [57, 17]. Antifungal activities are also proved [56, 58]. The aqueous extract of Karafs in rats showed a significant reduction in the serum total and cholesterol so; its anti-hyperlipidemic property is also evaluated. In Unani and Ayurveda text books abortifacient activity of Karafs is mentioned but pharmacological screening showed no effect as, abortifacient [59, 60, 61]. The Karafs seed contracts gravid and virginal uterus [23]. Karafs has anti-fertility, hepato-protective and insecticidal activities [17]. Antioxidant, cyclooxygenase and topoisomerase inhibitory compounds are separated from *Apiumgraveolens* Linn. Seeds [62]

CONCLUSION

Apiumgraveolens is a medicinal and aromatic plant with a diverse pharmacological properties and having considerable importance in particular to tranquilizing effects. Its active compounds such as 23 % Apiin, glucoside, which is made up of glucose and Apigenin, essential oil, *Apiol*, or *parsley camphor*, volatile oil have been recognised as the biologically active molecules possessing anti-fertility, hepato-protective, insecticidal and antimicrobial activities. The phenolic molecules present in Apium have been shown to possess potent antioxidant activity in a number of experiments. These bioactive chemical constituents in Apium can be developed as novel pharmacological lead molecules for further comprehensive experimental as well as clinical studies.

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