





## Review Article

Comprehensive review on the therapeutic potentials of fruits of Kaknaj (*Physalis alkekengi*).Samar Zakir<sup>1</sup>, Abdur Rauf<sup>1</sup>, Sumbul Rehman<sup>1</sup>, Abdurrahman<sup>2</sup>, Sana Saud<sup>1</sup>.<sup>1</sup>Department of Ilmul Advia, Faculty of Unani Medicine, A.M.U., Aligarh, U.P., India.<sup>2</sup>Allama Iqbal Unani Medical College and ACN Hospital, Muzaffarnagar, U.P., India.

| ARTICLE INFO   | ABSTRACT  |
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| <p><b>Article History</b></p> <p>Received : 05-May-2023<br/>Revised : 15-May-2023<br/>Accepted : 21-May-2023</p> <p><b>Key words</b></p> <p>Kaknaj,<br/><i>Physalis alkekengi</i>,<br/>Diuretic,<br/>Nephroprotective,<br/>Unani Medicine.</p> <p>NonCommercial-ShareAlike<br/>4.0 International License<br/>(CC BY-NC-SA)</p> | <p>The fruit of <i>Physalis alkekengi</i> Linn. (Family-Solanaceae), commonly known as Kaknaj/Habbe-Kaknaj is an important plant drug of Unani System of Medicine since antiquity. It is a diffuse perennial herb comprising about 100 species, of which only three species are native to India. The fruits are reddish or orange colored, fully covered by thin sheath of membrane consisting of flattened, light brown colored reniform seeds. It has been used frequently by physicians since ancient time to ameliorate various renal disorders. The attributed effects of Kaknaj in Unani literature i.e., anti-inflammatory, lithotryptic, diuretic, nephroprotective and tonic to the kidney are considered instrumental for its efficacy in kidney and urinary bladder stones, urinary tract infections, wounds of kidney and urinary tract etc. The fruits are rich source of minerals, vitamins, fibers, carotenoids, proteins, flavonoids, polyphenols, polyunsaturated fatty acids, and phytosterols etc. The presence of active constituents like flavonoids, alkaloids (tropane), physalins (physalin A), withanolides, and sterols, is responsible for various pharmacological activities, the most promising of which include antimicrobial, antioxidant, anti-diabetic, renoprotective, anti-cancerous, anti-inflammatory, immunomodulatory, etc. Physalin A, one of the major bioactive compounds isolated from Kaknaj is reported to possess many pharmacological properties, including antifungal, anti-cough, anti-inflammatory, and analgesic in vivo and in vitro. The paper is meant to present a detailed description of Kaknaj highlighting its effect mentioned by Unani authors and its correlation with current studies.</p> |
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## INTRODUCTION

Kaknaj (*Physalis alkekengi*) is a well-known plant used in medicine since antiquity; Greeks as well as Romans mentioned its uses in their literatures. The Arabs called it 'Kakanaj' while for Persians it was 'Kakanah'; a plant that is supposed to cure bladder diseases. Abu Hanifah, described it as "a plant resembling to *Peganum hermala* except that it is taller having round branches but the fruits are similar, capsulated red-

colored berries." Its leaves were used for dressing on painful regions. The Mahometan physicians describe it as diuretic, anthelmintic and alterative etc. It is recommended in skin diseases, rheumatism, and urinary affections. It is a diffuse perennial plant of family Solanaceae considered to be a native of region expanding from China to South East Europe. It has a glabrous or slightly pubescent stem bearing whitish

flowers and reddish fruits, 4-12 cm long, with blood red inflated calyx, often grown as an ornamental plant. The most distinctive morphological feature of *Physalis alkekengi*, making it easily identifiable, is the large, bright orange to red calyx covering over the fruit at maturity. The fruit resembles to a small dried cherry in its size, shape and color, the skin is smooth and shiny, reddish brown much shrivelled, the fruit contains many flattened, light brown coloured, reniform seeds which are smaller than those of *Withania coagulans*. The seeds are sticky due to the presence of small quantity of brown pulp, which has a fruity odour. The berries are enveloped in the bladder calyx and are also called as Chinese lantern. Its different types/varieties have been described in Unani literature [1-3].



Figure: Kaknaj (Fruits of *Physalis alkekengi*).

#### Taxonomy

|         |                    |
|---------|--------------------|
| Kingdom | : Plantae          |
| Phylum  | : Tracheophyta     |
| Class   | : Asterids         |
| Order   | : Solanales        |
| Family  | : Solanaceae       |
| Genus   | : <i>Physalis</i>  |
| Species | : <i>Alkekengi</i> |

#### Vernaculars [4-11]

Arabic : Kaknaj, Habbul Kaknaj, Jauzul marj, Habbul tahwa, Bazars

Persian : Kakanah, Uroosak-e pase pardah, Uroosak-e-darpardah, Uroos darpardah

English : Strawberry tomato, winter cherry, Puneeriaco agulaus

Hindi : Ralpotika, Banpootika, Paptan

Unani : Qasooleedus, Qaseedas, Qasookeedun, Islarakhnos

Urdu : Papotan

Latin : Haleela-kayam, *Physalis alkekengi*

French : Coqueret, Coquerelle

#### Habitat and Distribution

The plant is native in the regions of China, Persia, United States and South East Europe; however, it is naturalized in many countries of tropical North and South America. Around 100 species of the plant are found around the world among which only 3 are native to India and are widely distributed all over [2, 11,12].

#### Morphology

It is a diffuse perennial herb about 32 inches (80 cm) long having glabrous or slightly pubescent stems and oval (or diamond) shaped leaves. Flowers are white colored. The fruits are reddish-orange colored, 4-12 cm, long, spherical, smooth, and marked with greenish colored stripes, fully covered with a thin sheath of membrane (a translucent papery red colored calyx). The dried berries are globose, about 1 to 15 cm in diameter, outer surface wrinkled, with dried flesh; completely packed with seeds; juicy and have an acidulous bitter taste. Insignificant placenta is present; seeds are numerous, flattened, reniform 1.8 to 22 mm in size with curved embryo; taste is bitterish, somewhat acidulous [1, 12, 13].

#### Unani Description (Mahiyat)

Kaknaj (fruit of *Physalis alkekengi*) is generally termed as Habb-e-Kaknaj in Unani literature. It has been mentioned by several Unani physicians who described the morphology of the plant in detail. The plant of Kaknaj resembles much with that of Mako (*Solanum nigrum*). The height of the plant is approximately one yard and it grows widely in autumn along with the crops of maize, millets, and corn. The branches are thin downy towards the earth. Leaves are about two inches long but wider than the leaves of *Solanum nigrum* bearing dusty colour trichomes found on surface. Flowers are reddish white but some physicians said it might be yellow colour. The fruits are reddish in and

are similar in shape but little bigger than the fruits of *Solanum nigrum*, taste is somewhat sweet. They are covered in this sheath of a membrane whose shape resembles to that of urinary bladder. It is of two types; Bustani (cultivated) and Pahadi (wild). The cultivated variety is greenish initially and reddish as ripened while the wild type is yellowish initially and reddish yellow on ripening. By Kaknaj, the cultivated variety is referred and it is considered better. The fruits contain large number of flattened reniform seeds of light brown colour [5, 7-10].

**HESAS-I-MUSTAMALA (PARTS USED):** Fruits [5]

**MIZAJ (TEMPERAMENT):** Cold and Dry (2°) [5, 8, 10, 14]

**MIQDAR-I-KHURAK (DOSES):** 5-7 g [8, 9], 7-15 g [5], 6 pieces (fruit) [10].

**MUZIR ASARAT (ADVERSE EFFECTS):** It may produce adverse effect on kidney if given in higher than recommended dose, because of its high diuretic activity. Its high dose may also produce Mukhaddir (Anaesthetic) effect [5, 6, 7].

**MUSLEHAT (CORRECTIVES):** It includes Gul-e-Surkh (*Rosa damascene*) Gulqand Aftabi, and Gil-e-Multani (*Bole arminia*) [5, 7, 8, 10].

**BADAL (SUBSTITUTE):** Mako (*Solanum nigrum*) or Bazar ul Banj safed (*Hyoscyamus albus*) or Tukhm e Khyar (*Cucumis sativus*), and Chilghoza (*Pinus gerardiana*) can be generally used as the substitutes [5, 6, 7, 8, 10].

**MURAKKABAT (COMPOUND FORMULATIONS):** Qurs-e-Kaknaj, Majoon Aqrab, and Majoon Hajrul Yahood [4, 8, 9].

#### **AFAAL (THERAPEUTIC ACTIONS)**

Mudirr-i-Bawl (diuretic), Dafi`-i-Ta`affun (antiseptic), Mukhaddir (anaesthetic), Qatil-i-Kiram (anthelmintic), Mukhrij-i-Didan-i-Am`a` (vermifuge), Mohallil (resolvent), Radi (repellent), Dafi Dhiq al-Nafas (anti-asthmatic), Mujaffif (desiccant), Mani` al-Haml (contraceptive), Musakkin-i- Atash (quenching thirst) [3, 5, 7, 8, 9, 10, 11, 12, 16].

#### **ISTEMALAAT (THERAPEUTIC USES)**

It is used as an ear drops in chronic ulcer of the ear (Buthur al-Udhun). It is used in respiratory diseases like dyspnoea (Usr al-Tanaffus), intestinal worm infestation (Didan al-Am`a`), urinary tract infection, diseases of kidney and, bladder (Amrad al-Kulya wa al-Mathana), Ulcers of kidney, bladder (Quruh al-Kulya wa al-Mathana), and urinary track (Quruh al-Majra-i-Bawl), pyuria (Bawl Middi), burning micturition (Hurqa al-Bawl). The infusion is used to eliminate bile, thus used

in jaundice (Yarqan). If taken 7 seeds, it is said to prevent conception (Man`-i-Haml), if given to women after menstruation. Externally it is applied to promote the absorption of tumours, boils, and carbuncles. The leaves are used as poultice on inflammation. The root is used locally for Nasoor chronic ulcer. The seeds are used as a diuretic in kidney diseases and used in night fall. The juice and seeds are given in strangury due to cantharides, in dropsy, rheumatism, gout, and skin diseases [3, 5, 9, 10, 11, 12, 15, 16].

#### **Phytochemical Constituents**

The fruits as well as leaves contain an amorphous bitter principle. The fruits contain vitamin C, a carotenoid pigment (Physalin), and probably an alkaloid. Strawberry contains malic and citric acids, a volatile matter, sugar, macilage, and water. They are found to be rich in alkaline and mineral salts, in lime, alkaloid, and in phosphates. They contain 0.05 per cent of manganese and therefore easily assimilable to highly enrich the mood. The berries contain sugar and citric acid. The leaves and calyx contain a bitter principle called Physalin. It contains Auroxanthin, mutatoxanthin, phydalein, zeaxanthin, and its cis-isomer. B-carotene from calyx; glycoalkaloids detected in seeds. The ripe berries are also a highly source of vitamins (A and C), phenolic antioxidants, minerals (P, Ca and Fe), pectin and other nutrients. Tigloidine (3.0), 3-tigloyloxytropine (33.0), asooylgfine (20.0%) and stopline isolated from roots, a new withanolide-physalactone-isolated [3, 12, 17, 18].

#### **Pharmacological Studies**

**Nephroprotective effect:** The ethanolic extract of the fruits of *Physalis alkekengi* were evaluated in the present study for its protective and curative effects against gentamicin (40 mg/kg) induced acute renal injury in albino rats. Blood urea, serum creatinine and histopathological features were taken as the indicators of nephrotoxicity. The result of the preventive regimen showed reduction in biochemical parameters and normalization of the kidney tissue while the curative group also showed good response in terms of two biochemical markers and regenerative processes. Thus, it was concluded that *Physalis alkekengi* possessed marked nephroprotective activity [19].

Similar study was conducted by Sabahatullah et al., (2010) on hydroalcoholic extract of *Physalis alkekengi* L. (PAHE) for its nephroprotective activity against cisplatin induced acute renal injury in albino rats. In the experimental regimen, the animals were administered two doses, 420mg/kg (equivalent to 3 gm of the traditional therapeutic crude dose), and 980mg/kg (equivalent to 7g) for 10 days. Cisplatin (7mg/kg, i.p.) was used at a single dose on 4th day of the experiment.

The results showed significant reduction in the elevated blood urea, serum creatinine, uric acid, TBARS level and normalized the histopathological changes [20].

Ahmad et al., (2020) evaluated the nephroprotective activity of aqueous and 50% hydroalcoholic extracts of a compound Tabékħ Käkñaj in albino rats. Cisplatin (5 mg/kg i.p.) was administered on 1st day to induce nephrotoxicity. The test drug was given 10 days in the dosage of 260 mg/ kg (aqueous extract) and 300 mg/kg (hydroalcoholic extract). The animals were sacrificed and blood sample was collected for the estimation of serum creatinine and blood urea. Kidneys were isolated for histopathological studies. A significant nephroprotective effect was observed in aqueous and hydroalcoholic groups when compared with plain control as well as the negative control groups ( $P < 0.001$ ) [21].

**Diuretic effect:** The diuretic effect of aqueous and 50% hydroalcoholic extracts of a compound Tabékħ Käkñaj was also assessed by Ahmad et al., (2020) on albino rats with furosemide (25 mg/kg), taken as standard. The urine passed by the animals during 6 hours was collected and total urine output, sodium and potassium concentration were estimated. The study showed that the treated groups of the test drug possess moderate diuretic, natriuretic and kaliuretic activity [21].

**Steroid effect:** Ahmad et al., (2020) also studied the steroidal effect of aqueous and 50% hydroalcoholic extracts of a compound Tabékħ Käkñaj with hydrocortisone (33.3 µgm) taken as standard. On 4th day, all the animals were sacrificed and thymus glands were dissected out and their weights were measured. The test drug reduced the weight of thymus gland significantly in aqueous and 50% hydroalcoholic extracts as compared to control group. The results obtained as mean  $\pm$  S.E.M significance were determined by using ANOVA one way with Tukey Kramer multiple comparison tests [21].

## CONCLUSION

The paper is meant to present a detailed description of Kakñaj highlighting its effect mentioned by Unani authors and its correlation with current studies.

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