




Review Article

Comprehensive review on the therapeutic potentials of fruits of Kaknaj (*Physalis alkekengi*).

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ARTICLE INFO	ABSTRACT
<p>Article History</p> <p>Received : 05-May-2023 Revised : 15-May-2023 Accepted : 21-May-2023</p> <p>Key words</p> <p>Kaknaj, <i>Physalis alkekengi</i>, Diuretic, Nephroprotective, Unani Medicine.</p> <p>NonCommercial-ShareAlike 4.0 International License (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

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



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

45 Taxonomy

46 Kingdom : Plantae
 47 Phylum : Tracheophyta
 48 Class : Asterids
 49 Order : Solanales
 50 Family : Solanaceae
 51 Genus : *Physalis*
 52 Species : *Alkekengi*

53 Vernaculars [4-11]

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

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

58 English : Strawberry tomato, winter cherry, Puneeriaco
 59 agulaus

60 Hindi : Ralpotika, Banpootika, Paptan

61 Unani : Qasooleedus, Qaseedas, Qasookeedun,
 62 Islarakhnos

63 Urdu : Papotan

64 Latin : Haleela-kayam, *Physalis alkekengi*

65 French : Coqueret, Coquerelle

66 Habitat and Distribution

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

73 Morphology

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

88 Unani Description (Mahiyat)

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

102 are similar in shape but little bigger than the fruits of 152
 103 *Solanum nigrum*, taste is somewhat sweet. They are 153
 104 covered in this sheath of a membrane whose shape 154
 105 resembles to that of urinary bladder. It is of two types; 155
 106 Bustani (cultivated) and Pahadi (wild). The cultivated 156
 107 variety is greenish initially and reddish as ripened while 157
 108 the wild type is yellowish initially and reddish yellow 158
 109 on ripening. By Kaknaji, the cultivated variety is referred 159
 110 and it is considered better. The fruits contain large 160
 111 number of flattened reniform seeds of light brown 161
 112 colour [5, 7-10].

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

114 **MIZAJ (TEMPERAMENT):** Cold and Dry (2°) [5, 8, 10, 164
 115 14]

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

118 **MUZIR ASARAT (ADVERSE EFFECTS):** It may produce 169
 119 adverse effect on kidney if given in higher than 170
 120 recommended dose, because of its high diuretic 171
 121 activity. Its high dose may also produce Mukhaddir 172
 122 (Anaesthetic) effect [5, 6, 7].

123 **MUSLEHAT (CORRECTIVES):** It includes Gul-e-Surkh 174
 124 (*Rosa damascena*) Gulqand Aftabi, and Gil-e-Multani 175
 125 (*Bole arminia*) [5, 7, 8, 10].

126 **BADAL (SUBSTITUTE):** Mako (*Solanum nigrum*) or 178
 127 Bazar ul Banj safed (*Hyoscyamus albus*) or Tukhm e 179
 128 Khyar (*Cucumis sativus*), and Chilghoza (*Pinus* 180
 129 *gerardiana*) can be generally used as the substitutes [5, 181
 130 6, 7, 8, 10].

131 **MURAKKABAT (COMPOUND FORMULATIONS):** Qurs- 182
 132 e-Kaknaji, Majoon Aqrab, and Majoon Hajrul Yahood [4, 183
 133 8, 9].

134 **AFAAL (THERAPEUTIC ACTIONS)**

135 Mudirr-i-Bawl (diuretic), Dafi`-i-Ta`affun (antiseptic), 187
 136 Mukhaddir (anaesthetic), Qatil-i-Kiram (anthelmintic), 188
 137 Mukhrij-i-Didan-i-Am`a` (vermifuge), Mohalli 189
 138 (resolvent), Radi (repellent), Dafi Dhiq al-Nafas (anti- 190
 139 asthmatic), Mujaffif (desiccant), Mani` al-Haml 191
 140 (contraceptive), Musakkin-i- Atash (quenching thirst) 192
 141 [3, 5, 7, 8, 9, 10, 11, 12, 16].

142 **ISTEMALAAT (THERAPEUTIC USES)**

143 It is used as an ear drops in chronic ulcer of the ear 196
 144 (Buthur al-Udhun). It is used in respiratory diseases like 197
 145 dyspnoea (Ushr al-Tanaffus), intestinal worm infestation 198
 146 (Didan al-Am`a`), urinary tract infection, diseases of 199
 147 kidney and, bladder (Amrad al-Kulya wa al-Mathana), 200
 148 Ulcers of kidney, bladder (Quruh al-Kulya wa al- 201
 149 Mathana), and urinary track (Quruh al-Majra-i-Bawl), 202
 150 pyuria (Bawl Middi), burning micturition (Hurqa al- 203
 151 Bawl). The infusion is used to eliminate bile, thus used 204

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].

162 Phytochemical Constituents

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

182 Pharmacological Studies

183 **Nephroprotective effect:** The ethanolic extract of the
 184 fruits of *Physalis alkekengi* were evaluated in the
 185 present study for its protective and curative effects
 186 against gentamicin (40 mg/kg) induced acute renal
 187 injury in albino rats. Blood urea, serum creatinine and
 188 histopathological features were taken as the indicators
 189 of nephrotoxicity. The result of the preventive regimen
 190 showed reduction in biochemical parameters and
 191 normalization of the kidney tissue while the curative
 192 group also showed good response in terms of two
 193 biochemical markers and regenerative processes. Thus,
 194 it was concluded that *Physalis alkekengi* possessed
 195 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.

205 The results showed significant reduction in the elevated 255
206 blood urea, serum creatinine, uric acid, TBARS level and 256
207 normalized the histopathological changes [20]. 257

208 Ahmad et al., (2020) evaluated the nephroprotective 258
209 activity of aqueous and 50% hydroalcoholic extracts of a 259
210 compound Tabékħ Käkñaj in albino rats. Cisplatin (5260
211 mg/kg i.p.) was administered on 1st day to induce 261
212 nephrotoxicity. The test drug was given 10 days in the 262
213 dosage of 260 mg/ kg (aqueous extract) and 300 mg/kg 263
214 (hydroalcoholic extract). The animals were sacrificed 264
215 and blood sample was collected for the estimation of
216 serum creatinine and blood urea. Kidneys were isolated 265
217 for histopathological studies. A significant 266
218 nephroprotective effect was observed in aqueous and 267
219 hydroalcoholic groups when compared with plain 268
220 control as well as the negative control groups ($P < 0.001$) 269
221 [21]. 270

222 **Diuretic effect:** The diuretic effect of aqueous and 50% 271
223 hydroalcoholic extracts of a compound Tabékħ Käkñaj 272
224 was also assessed by Ahmad et al., (2020) on albino rats
225 with furosemide (25 mg/kg), taken as standard. The 273
226 urine passed by the animals during 6 hours was 274
227 collected and total urine output, sodium and potassium 275
228 concentration were estimated. The study showed that 276
229 the treated groups of the test drug possess moderate 277
230 diuretic, natriuretic and kaliuretic activity [21]. 278

231 **Steroid effect:** Ahmad et al., (2020) also studied the 279
232 steroidal effect of aqueous and 50% hydroalcoholic 280
233 extracts of a compound Tabékħ Käkñaj with
234 hydrocortisone (33.3 µgm) taken as standard. On 4th 281
235 day, all the animals were sacrificed and thymus glands 282
236 were dissected out and their weights were measured. 283
237 The test drug reduced the weight of thymus gland 284
238 significantly in aqueous and 50% hydroalcoholic 285
239 extracts as compared to control group. The results 286
240 obtained as mean \pm S.E.M significance were determined 287
241 by using ANOVA one way with Tukey Kramer multiple 288
242 comparison tests [21]. 289

243 CONCLUSION 290

244 The paper is meant to present a detailed description of 291
245 Kakñaj highlighting its effect mentioned by Unani 292
246 authors and its correlation with current studies. 293

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