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A PROSPECTIVE PHARMACOLOGICAL REVIEW OF MEDICINAL HERBS, *CUCUMIS MELO* AND *BERBERIS VULGARIS*, COMMONLY USED IN THE TREATMENT OF RENAL DISEASES IN PAKISTAN

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Abstract: The kidneys are important organs which have many functions in the body, including the production of hormones, absorbtion of minerals and the filtration of blood, producing urine. Their failure can be fatal, therefore, to focus the study of such herbs which may be useful in treating renal disease is the need of hour. In Pakistan, *Cucumis melo* and *Berberis vulgaris* has been commonly used for renal problems. In both of these plants were found flavonoids, alkaloids and terpenes, which may stand for their renal protective properties. Their reported vitamin E contents and antioxidant potentials also provide a base for their defensive mechanism, may be due to their free radical scavenging properties. Further, their diuretic and urinary tract anti-ulcer properties also support their traditional use in renal diseases. Their anti-histaminic and anti-cholinergic properties also provide symptomatic treatment by decreasing prostaglandin level and due to antispasmodic properties. Concluding, both of these plants can be used for renal problems, especially *Cucumis melo*, which have both the nutritive and medicinal properties. Therefore, the renal disease patients are advised to take much of this particular fruit, especially their seeds to make their kidneys healthy.

Keywords: renal problems, Pakistani herbs, *Cucumis melo*, *Berberis vulgaris*, pharmacology

Renal failure is a condition in which the kidneys fail to adequately filter waste products from the blood. The two main types are acute renal damage, which is often reversible with adequate management, and chronic kidney damage, which is often not reversible. Renal failure is mainly determined by a decrease in glomerular filtration rate. Long term kidney problems are coupled with an increased risk of heart diseases (1).

Acute renal damage is accompanied with rapid and progressive loss of renal function characterized by decreased urine production, quantified as less than 400 mL per day in adults (2). On the other hand, diuretics are the agents which cause an increase in the urinary output. These drugs are generally used in the treatment of hypertension, pulmonary and systemic edema (3). Overuse of several drugs such as aspirin, ibuprofen and acetaminophen may lead to chronic renal damage (4).

Many indigenous drugs have been claimed to have diuretic effect in Ayurvedic system of medicine but they were not properly investigated (5). Pakistan, especially northern areas of Pakistan, is a rich source of medicinal plants and a number of plants extracts are used against diseases in various systems of medicine as Ayurveda, Unani, and Siddha. Only a few of them have been scientifically explored. Plant derived natural products such as flavonoids, terpenes, alkaloids, carbohydrates and tannins have got considerable attention in recent years due to diverse pharmacological properties. Several indigenous plant extracts were found effective against various renal diseases according to the literature search, including the most important two, i.e., *Cucumis melo* and *Berberis vulgaris*.

Therefore, in this article, the two renal important medicinal plants of Pakistan, namely, *Cucumis melo* and *Berberis vulgaris* were crucially, pharmacologically reviewed to elaborate their importance in health care.

METHODOLOGY

Data were collected through internet search on Science direct, PubMed and Google (6). The key words used for this search were: renal damage, herbs

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used in Pakistan for the treatment of renal disease, *Cucumis melo* and *Berberis vulgaris*. Indigenous medicinal herbs were selected on the basis of their importance in the treatment of renal damage. All the references and claims were thoroughly rechecked with the literature.

RESULTS AND DISCUSSION

Cucumis melo Linn. belongs to the family Cucurbitaceae. It is a beautiful, juicy and delicious fruit known for its medicinal and nutritional properties. The origin of the plant has been disputed, but literature indicates south and east Africa. However, it is found and cultivated throughout the world. Fruits vary in size, shape and rind. The outer skin may be smooth or netted. The leaf is large, dark green and rough. It has somewhat heart shape, ovate or angled with 5-7 lobes. The petioles are 4-10 cm long with simple tendrils. Male and female, yellow flowers are present on a same plant. Flowers are staminate, clustered, pistillate, solitary or hermaphrodite with 1-3 cm diameter. Calyx is 5 lobed; 6-8 mm long. Petals are free, round in shape, 2 cm long with 3 stamens (7). Phytochemical studies revealed that the seeds of *Cucumis melo* contain chromone derivatives, phenolic glycoside, arginine, aspartic and glutamic acids, α-galactosidases, dihydroxytriterpenes, sitosterol 2, and β-sitosterol etc. (8-12). The active principles in these vegetal extracts are principally water soluble or lipophilic antioxidant molecules. Mops of these plant extracts contained various amounts of vitamin E, C, carotenes, triterpenoids and other flavonoids (13) and were used as potential antioxidant prophylactic agents for both health and disease management (14). The seeds are having lithotriptic, laxative, demulcent and cooling properties. In traditional medicine seed kernel is commonly used in renal disorders such as kidney and bladder stones, painful and burning micturation, ulcers in the urinary tract, suppression of urine, jaundice, vitiligo, ascites, chronic fevers, inflammation of the liver and kidney, and in general debility (15-17).

Its seeds are commonly used as diuretic. These are also cooling and nutrient. The pulp of fruit is also diuretic (18) useful in chronic eczema (19) and as anthelmintic (20). Further, it is used in painful micturition and suppression of urine (21). The plant has been reported with strong antiulcer activities, due to its antioxidant potential (22). Anti-hyperlipidemic activity of *C. melo* fruit peel extract in triton induced hyperlipidemia has also been reported in rats as equipotent as atorvastatin (23).

Earlier studies on the Cucurbitaceae family showed that *C. melo* pulp extract possesses high antioxidant and anti-inflammatory properties (24). Anti-diabetic properties of the seed extract on streptozotocin induced diabetic rats have also been reported (25). Concludingly, *C. melo* fruit has been traditionally used for their diuretic, antihelmentic and cooling effect. It is a good source for appetite, weight loss, urinary tract infections, constipation, acidity, and ulcers (26). It is recommended for the treatment of cardiovascular diseases, anti-tussive, stomachic, as a vermifuge, as analgesic and anti-inflammatory (7). Adekunle and Oluvo reported the anti-fungal effect of *C. melon var agrestis*, on *A. flavus*, *A. niger*, *A. wenti*, *Botrodiplodia theobromae*, *Penicillium pinophylum*, *Mucor* species, *Phycomyces* species and *Rhizopus* species (27).

Barberry (*Berberis vulgaris* L. family Berberidaceae), which grows in Asia and Europe, is a shrub with yellow wood and obovate leaves, bearing pendulous yellow flowers succeeded by oblong red colored fruits. The constituents reported in this plant are berberine, berbamine, palmatine, oxyacanthine, malic acid and berberubin (28). The plant is a shrub, 1-3 m tall, spiny, with yellow wood and obviate leaves, bearing pendulous yellow flowers succeeded by oblong red berries (28, 29). It has leathery leaves that are egg-shaped and little red fruits in the form of clusters hanging from the branches. Barberry has a long history of use in traditional eastern and western herbalism (30). *Berberis vulgaris* as well as other berberine (BER) containing plants (31) are used medicinally in virtually all-traditional medical systems, and have a history of usage in Ayurvedic, Iranian and Chinese medicine dating back at least 3,000 years (32). Barberries contain organic acids and phenol compounds that contain anthocyanin and carotenoid pigments as well as phenolase, polyphenolase and glycosidase enzymes. Medicinal properties for all parts of the plant have been reported, including tonic, antimicrobial, antiemetic, antipyretic, antipruritic and cholagogue actions and it has been used in some cases like cholecystitis, cholelithiasis, jaundice, dysentery, leishmaniasis, malaria and gall stones (28, 29, 33).

In Iranian traditional medicine, several properties such as antibacterial, antiemetic, antipyretic and antipruritic has been reported for different parts of *B. vulgaris* (28, 33, 34). Meanwhile, several pharmacological studies on berberine, an isoquinoline alkaloid found in the root, bark and fruit of *B. vulgaris*, have demonstrated that it possesses anti-inflammatory, antinociceptive, hypoglycemic and hypolipidemic effects (35-39).

Barberry fruit is extensively used as food additive and its juice is recommended to cure cholecystitis (28). Nevertheless, little pharmacological studies have been performed on barberry fruit. It has been shown that the crude extract of barberry fruit possesses the antihistaminic and anticholinergic activities (40).

Further, the pharmacologic actions of berberine also include metabolic inhibition of certain organisms, inhibition of bacterial enterotoxin formation, inhibition of intestinal fluid accumulation and ion secretion, inhibition of smooth muscle contraction, reduction of inflammation, platelet aggregation inhibition, platelet count elevation in certain types of thrombocytopenia, stimulation of bile and bilirubin secretion, and inhibition of ventricular tachyarrhythmias (41, 42).

Ancient Egyptians used barberry fruit with fennel seeds to ward off pestilent fevers (30). Indian ayurvedic physicians used barberry in the treatment of dysentery and traditional Iranian medicine uses its fruit as a sedative (30, 43). In northern Europe, barberry was used to treat gall bladder and liver problems, while it was used in the treatment of abnormal uterine bleeds and rheumatism in Russia and Bulgaria (44, 45). In North America, the Eclectics used barberry for treatment of malaria and as a general tonic (46). Also, the American Indians found it effective in improving appetite and used its dried fruit as a gargle (47, 48).

CONCLUSION

The present article demonstrates the pharmacological importance of two selected indigenous medicinal plants in renal diseases, with a prospective pharmacological review. According to the studied literature, *Cucumis melo*, was found with both nutritive and medicinal properties. Therefore, the kidney patients are advised to use more and more fruits of this particular specie, especially their seeds are crushed and take with plenty of water; to increase the working tone of kidneys.

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REFERENCES

1. Liao M.T., Sung C.C., Hung K.C., Wu C.C., Lo L., Lu K.C.: J. Biomed. Biotechnol. 691369 (2012).
2. Klahr S., Miller S.B.: New Eng. J. Med. 338, 671 (1998).
3. Danamma B., Kumari K.A., Goud B.J., Basha S.N.: Int. J. Pharm. Biol. Sci. 1, 160 (2011).
4. Perneger T.V., Whelton P.K., Klag M.J.: New Eng. J. Med. 331, 1675 (1994).
5. Samuilla D.S., Harsh M.S.: Indian J. Pharmacol. 32, 112 (2000).
6. Nasim M.J., Hasan bin Asad M.H., Sabih D.E., Ikram R.M., Hussain M.S. et al.: Acta Pol. Pharm. Drug Res. 71, 3 (2014).
7. Milind P., Kulwant S.: Int. Res. J. Pharm. 2, 52 (2011).
8. Chen C., Qiang S., Lou L., Zhao W.: J. Nat. Prod. 72, 824 (2009).
9. Ibrahim S.R.: Nat. Prod. Commun. 5, 403 (2010).
10. Mian-hao H., Yansong A.: Int. J. Food Sci. Tech. 42, 1397 (2007).
11. Gao Z., Schaffer A.A.: Plant Physiol. 119, 979 (1999).
12. Akihisa T., Kimura Y., Kasahara Y., Kumaki K., Thakur S., Tamura T.: Phytochemistry 46, 1261 (1997).
13. Aruoma O.I.: Mutation Res. 523, 9 (2003).
14. Peng J., Jones G.L., Watson K.: Free Radic. Biol. Med. 28, 1598 (2000).
15. Baitar I.E.: Aljamaiul Mufradat-ul Advia Wal Aghzia, p. 248, CCRUM, New Delhi 2003.
16. Kabiruddin M.: Makhzanul Mufradat, p. 273, Sheikh Mohammad Bashir & Sons, Lahore, Pakistan 1951.
17. Ibn-e-Rushd A.W.M.B.: Kitabul kulliyat, p. 255, CCRUM, New Delhi 1980.
18. Nadkarni A.K.: Indian Materia Medica, p. 338, 3rd edn., Popular Book Depot, Bombay 1954.
19. Kirtikar K.R., Basu B.D.: Indian Medicinal Plants, p. 179, 2nd edn., Mohan Basu, Allahabad, India 1933.
20. Zinchenko T.V., Mindlin M.Z., Prokopovich N.N.: Farmakol. Toksikol. 18, 41 (1955).
21. Chopra R.N., Chopra I., Hand K.L., Kapur L.D.: Indigenous drugs of India, p. 67, Dhur and Sons Private Ltd., Calcutta 1958.
22. Yuan Y., Padol I.T., Hunt R.H.: Nat. Clin. Pract. Gastroenterol. Hepatol. 3, 80 (2006).
23. Ghanwat D.D., Bidkar J.S., Bhujbal M.D., Dama G.Y.: Int. J. Univers. Pharm. Bio Sci. 1, 1 (2012).
24. Vouldoukis I., Lancan D., Kamate P., Coste P., Calenda A., Mazier D.: J. Ethnopharmacol. 94, 67 (2004).
25. Sathishsekar D., Subramanian S.: Asia Pac. J. Clin. Nutr. 14, 153 (2005).

26. Desai B.B.: Seeds Handbook: Biology, Production, Processing and Storage, 2nd edn., p. 103, CRC Press, New York 2004.
27. Adekunle A.A., Oluvo A.A.: Am. J. Food Technol. 3, 141 (2008).
28. Zargari A.: Medicinal Plants, p. 68, Tehran University Press, Tehran 1983.
29. Amin Gh.: Popular Medicinal Plants of Iran, p. 114, Health Ministry Press, Tehran 1991.
30. Chevallier A.: The Encyclopedia of Medicinal Plants, St. Leonards, Dorling Kindersley 2001.
31. Souri E.A.G., Dehmobed-Sharifabadi A., Nazifi A., Farsam H.: Iranian J. Pharm. Res. 3, 55 (2004).
32. Timothy C.B.N., Gregory S., Kelly N.D.: Altern. Med. Rev. 2, 94 (1997).
33. Nafissi A.: Foods and Drinks Properties, p. 150, Isfehan University Press, Isfehan 1990.
34. Aynehchi Y.: Pharmacognosy and Medicinal Plants of Iran, p. 1041, Tehran University Press, Tehran 1986.
35. Kupeli E., Kosar M., Yesilada E., Husnu K., Baser C.: Life Sci. 72, 645 (2002).
36. Leng S.H., Lu F.E., Xu L.J.: Acta Pharmacol. Sin. 25, 496 (2004).
37. Ko B.S., Choi S.B., Park S.K., Jang J.S., Kim Y.E., Park S.: Biol. Pharm. Bull. 28, 1431 (2005).
38. Pan G.Y., Huang Z.J., Wang G.J., Fawcett J.P., Liu X.D., Zhao X.C., Sun J.G., Xie Y.Y.: Planta Med. 69, 632 (2003).
39. Kong W., Wei J., Abidi P., Lin M., Inaba S., Li C., Wang Y. et al.: Nat. Med. 10, 1344 (2004).
40. Shamsa F., Ahmadiani A., Khosrokhavar R.: J. Ethnopharmacol. 64, 161 (1999).
41. Birdsall T.C., Kelly G.S.: Altern. Med. Rev. 2, 94 (1997).
42. Akhter M.H., Sabir M., Bhide N.K.: Indian J. Med. Res. 70, 233 (1979).
43. Kunwar R.M., Nepal B.K., Kshhetri H.B., Rai S.K., Bussmann R.W.: J. Ethnobiol. Ethnomed. 2, 27 (2006).
44. Fatehi-Hassanabad Z., Jafarzadeh M., Tarhini A., Fatehi M.: Phytother. Res. 19, 222 (2005).
45. Ivanovska N., Philipov S.: Int. J. Immunopharmacol. 18, 553 (1996).
46. Imanshahidi M., Hosseinzadeh H.: Phytother. Res. 22, 999 (2008).
47. Mills S., Bone K.: Principals and Practice of Phytotherapy, Churchill Livingstone, Edinburgh 2000.
48. Bone K.: A Clinical Guide to Blending Liquid Herbs: herbal formulations for the individual patient, Churchill Livingstone, St Louis, Missouri 2003.

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