



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; 6(5): 1780-1787
Received: 27-07-2017
Accepted: 28-08-2017

Salman Ahmed
Lecturer, Department of
Pharmacognosy, Faculty of
Pharmacy and Pharmaceutical
Sciences, University of Karachi,
Karachi, Pakistan

Imran Ahsan Mallick
Assistant Professor,
Department of Pharmacy
Practice, Dow College of
Pharmacy, Dow University of
Health Sciences, Karachi,
Pakistan

**Muhammad Mohtasheemul
Hasan**
Associate Professor,
Department of Pharmacognosy,
Faculty of Pharmacy and
Pharmaceutical Sciences,
University of Karachi, Karachi,
Pakistan

Correspondence
Salman Ahmed
Lecturer, Department of
Pharmacognosy, Faculty of
Pharmacy and Pharmaceutical
Sciences, University of Karachi,
Karachi, Pakistan

Exploring globally used antiurolithiatic plants of A to L families: Asteraceae, Fabaceae and Lamiaceae revisited

Salman Ahmed, Imran Ahsan Mallick and Muhammad Mohtasheemul Hasan

Abstract

Urolithiasis is a common worldwide problem with high recurrence. This review covers forty four (44) families starting from alphabet A to L and includes Bignoniaceae (05); Araceae, Burseraceae, Combretaceae (04); Annonaceae, Berberidaceae, Betulaceae, Gentianaceae, Gesneriaceae (03); Aizoaceae, Adiantaceae, Alismataceae, Aristolochiaceae, Asclepiadaceae, Bombacaceae, Cannabaceae, Cyperaceae, Geraniaceae and Iridaceae (02); Acoraceae, Adoxaceae, Armatellaceae, Aquifoliaceae, Araliaceae, Avertroaceae, Basellaceae, Begoniaceae, Bromeliaceae, Cactaceae, Calophyllaceae, Campanulaceae, Caprifoliaceae, Caricaceae, Celastraceae, Clusiaceae, Dracaenaceae, Dryopteridaceae, Elaeagnaceae, Grossulariaceae, Hyacinthaceae, Hydrangeaceae, Hypoxidaceae, Ilcebraceae and Juglandaceae (01) plant used globally in different countries. The plants of three families Asteraceae, Fabaceae and Lamiaceae are revisited to provide updated information. This review will not only be useful for the general public but also attract the scientific world for antiurolithiatic drug discovery.

Keywords: Urolithiasis, antiurolithiatic, natural products, drug development.

Introduction

Urolithiasis is a common worldwide problem with high recurrence. Medicinal plants have been used in different countries and cultures for not only prophylactic management but also for treatment. Present paper is one of the parts of our study entitled "Searching globally used antiurolithiatic plants belonging to different families". The plants of the ninety three (93) families including Acanthaceae, Amaranthaceae, Amaryllidaceae, Anacardiaceae, Apiaceae, Apocynaceae, Arecaceae, Asparagaceae, Aspleniaceae, Asteraceae, Boraginaceae, Brassicaceae, Caesalpiniaceae, Capparidaceae, Caryophyllaceae, Chenopodiaceae, Convolvulaceae, Costaceae, Cucurbitaceae, Cupressaceae, Ebenaceae, Equisetaceae, Ericaceae, Euphorbiaceae, Fabaceae, Fagaceae, Hypericaceae, Lamiaceae, Lauraceae, Liliaceae, Lythraceae, Magnoliaceae, Malpighiaceae, Malvaceae, Meliaceae, Menispermaceae, Molluginaceae, Moraceae, Moringaceae, Musaceae, Myoporaceae, Myrtaceae, Nyctaginaceae, Oleaceae, Onagraceae, Orchidaceae, Oxalidaceae, Paeoniaceae, Papaveraceae, Parmeliaceae, Parnassiaceae, Pedaliaceae, Periplocaceae, Phyllanthaceae, Pinaceae, Piperaceae, Plantaginaceae, Platanaceae, Poaceae, Polygalaceae, Polygonaceae, Polypodiaceae, Portulacaceae, Primulaceae, Punicaceae, Ranunculaceae, Rhamnaceae, Rosaceae, Rubiaceae, Rutaceae, Salicaceae, Salvadoraceae, Santalaceae, Sapotaceae, Saxifragaceae, Scrophulariaceae, Simaroubaceae, Smilacaceae, Solanaceae, Tamaricaceae, Theaceae, Tiliaceae, Tropaeolaceae, Typhaceae, Ulmaceae, Urticaceae, Valerianaceae, Verbenaceae, Violaceae, Vitaceae, Xanthorrhoeaceae, Zingiberaceae and Zygophyllaceae [1-10] have already been discussed. The present review article covers forty four families starting from alphabet A to L. The medicinal plants of these families used against urolithiasis in different countries including Albania, Algeria, America, Bangladesh, Bosnia, Herzegovina, Brazil, Canada, Chile, China, Cyprus, Eastern Albania, India, Iran, Italy, Kyrgyzstan, Mexico, Pakistan, Palestine, Peru, Romania, Saudi Arabia, Thailand, Trinidad, Tunisia, Turkey, Uzbekistan and Vietnam. The plants of three families Asteraceae [3], Fabaceae [5] and Lamiaceae [7] against urolithiasis have already been discussed and now are revisited to provide updated information (Table-2). Their historical antiurolithiatic background have also been shared in well known books of Dioscorides (De Materia Medica), Pliny the Elder (Naturalis Historis), Ibn Sina (Al Qanoon Fit Tibb), Al Razi / Rhazes (Al-Hawi fi al-Tibb) and Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia). The summarized information is presented in Table-1 and 2.

Abbreviations Used

h. = hour.

OD = once daily.

QID = four times a day.

tbsp. = table spoon.

TID = three times a day.

tsp. = tea spoon.

Days = days required to dissolve / expel kidney stones.

Before breakfast = every morning in empty stomach.

Brushite = Calcium hydrogen phosphate dihydrate.

Whewellite: Calcium oxalate monohydrate.

MSUM: Mono sodium urate monohydrate.

Table 1: Antiuro lithiatic plants of different families (A-L).

| Plants | Explanation |
|--|---|
| Acoraceae (01) | |
| <i>Acorus calamus</i> L. | Ibn Sina (Al Qanoon Fit Tibb): Roots are diuretic ^[11] . |
| | Roots decoction--- Iran ^[12] . |
| | Pharmacological activities: Roots possess antioxidant and litholytic properties ^[13, 14] . |
| Adiantaceae (02) | |
| <i>Adiantum capillus-veneris</i> L. | Dioscorides (De Materia Medica): Whole plant is litholytic and used against dysuria; |
| | Ibn Sina (Al Qanoon Fit Tibb): Whole plant is litholytic and expels stones ^[11] . |
| | Leaves infusion --- India ^[14] , Iran, Turkey ^[12] . |
| | Pharmacological activities: Leaves possess analgesic, anti-inflammatory, antioxidant ^[14] , demulcent, diuretic, lithotriptic ^[15] and litholytic ^[16] properties. |
| <i>Adiantum venustum</i> D. Don. | Antiuro lithiatic spectrum (reported): Leaves against whewellite ^[17] . |
| | Leaves and rhizome decoction --- India ^[18] . |
| | India: Leaves powder with luck water BD till stone expulsion ^[18] . |
| Adoxaceae (01) | |
| <i>Viburnum opulus</i> L. | Fruits --- Turkey ^[19] . |
| | Pharmacological activities: Fruits possess antioxidant, diuretic and lithotriptic ^[19] . |
| | Antiuro lithiatic spectrum (reported): Fruits against whewellite ^[19] . |
| Aizoaceae (02) | |
| <i>Trianthema portulacastrum</i> L. | Leaves juice--- India, Pakistan ^[12] . |
| | India: 250 ml of fresh leaf juice BD for 7 days ^[20] . |
| | Pharmacological activities: Leaves possess analgesic, anti-inflammatory and diuretic properties ^[14, 21] . |
| <i>Zaleya pentandra</i> (L.) C. Jeffrey. | Root decoction --- Pakistan ^[12] . |
| Alismataceae (02) | |
| <i>Alisma orientale</i> (Sam.) Juz. | Root decoction --- Canada ^[20] . |
| | Canada: 2 tsp. dried root, 10 oz. water, decoct 20 mins, steep 30 mins. 4 oz. TID till stone expulsion ^[20] . |
| <i>Alisma plantago-aquatica</i> L. | Ibn Sina (Al Qanoon Fit Tibb): Whole plant decoction is useful in kidney stones ^[11] . |
| | Plant decoction--- Iran ^[12] . |
| | Pharmacological activities: Whole plant possesses diuretic properties ^[14] . |
| Annonaceae (03) | |
| <i>Annona squamosa</i> L. | Antiuro lithiatic spectrum (reported): Fruits against whewellite ^[22] . |
| <i>Malmea depressa</i> (Baill) R.E. Fries. | Bark infusion --- Mexico ^[12] . |
| <i>Meiogyne minuta</i> (G. Forst.) Less. | Whole plant infusion --- India ^[12] . |
| Aristolochiaceae (02) | |
| <i>Asarum europaeum</i> L. | Dioscorides (De Materia Medica): Fruits are diuretic ^[11] . |
| | Leaves --- India ^[23] . |
| | Pharmacological activities: Antioxidant, anti-inflammatory, diuretic, lithotriptic ^[23] . |
| | Antiuro lithiatic spectrum (reported): Leaves against whewellite ^[23] . |
| <i>Aristolochia clematitis</i> Alain. | Al Razi / Rhazes (Al-Hawi fi al-Tibb): Whole plant expels stones ^[11] . |
| Armatellaceae (01) | |
| <i>Macaranga peltata</i> (Roxb.) Müll. Arg. | Bark --- India ^[24] . |
| Aquifoliaceae (01) | |
| <i>Ilex aquifolium</i> L. | Leaves decoction --- Eastern Albania ^[12] . |
| | Pharmacological activities: Anti-inflammatory, antioxidant ^[14] . |
| Araceae (04) | |
| <i>Arum rupicola</i> var. <i>detrunctum</i> Tzvelev. | Leaves infusion --- Turkey ^[12] . |
| <i>Colocasia esculenta</i> (L.) Schott. | Rhizome juice --- India ^[20] . |
| | India: 100 ml of rhizome juice OD for 5 days ^[20] . |
| <i>Dracunculus vulgaris</i> Schott. | Dioscorides (De Materia Medica): Diuretic ^[11] . |
| <i>Typhonium giganteum</i> Engl. | Whole plant --- Bangladesh ^[25] . |
| | Pharmacological activities: Lithotriptic ^[25] . |
| Araliaceae (01) | |
| <i>Hedera helix</i> L. | Aerial parts decoction --- Bosnia, Herzegovina ^[12] Italy, Tunisia ^[26] . |
| <i>Polyscias guilfoylei</i> (W.Bull) L.H.Bailey | Leaves decoction---Indonesia ^[27] . |
| Asclepiadaceae (02) | |
| <i>Asclepias syriaca</i> L. | Roots decoction --- America, Canada ^[12] . |
| <i>Leptadenia pyrotechnica</i> (Forsk.) Dec. | Aerial parts infusion --- Algeria ^[28] . |
| Averrhoaceae (01) | |

| | |
|--|---|
| <i>Averrhoa carambola</i> L. | Fruit juice --- India ^[12] . |
| | India: Mix 2.8 g silver element in 300 ml fruit juice. 125 ml OD for 5 days ^[20] . |
| | Pharmacological activities: Lithotriptic ^[29] . |
| | Antiuro lithiatic spectrum (reported): Fruits against brushite and whewellite ^[22] . |
| Basellaceae (01) | |
| <i>Basella alba</i> L. | Leaf extract --- India ^[20] . |
| | India: 25 ml of leaf extract in early morning on empty stomach till stone expulsion ^[20] . |
| | Antiuro lithiatic spectrum (reported): Leaves against whewellite ^[30] . |
| Berberidaceae (03) | |
| <i>Berberis aristata</i> DC. | Roots infusion before breakfast --- India ^[18] . |
| <i>Berberis brandisiana</i> Ahrendt. | Roots and stem bark --- Pakistan ^[31] . |
| <i>Berberis integerrima</i> Bunge. | Leaves decoction --- Uzbekistan, Kyrgyzstan ^[12] ; fruits --- Iran ^[32] . |
| | Pharmacological activities: Anti-inflammatory, antioxidant ^[14] . |
| <i>Berberis vulgaris</i> L. | Root decoction --- Canada, India ^[20, 33] . |
| | Canada: 1 tsp. dried root bark to 10 oz. water, decoct 10-15 mins, steep 30 mins. 4 oz. BD till stone expulsion ^[20] . |
| | Pharmacological activities: Anti-inflammatory, antioxidant, litholytic ^[14] lithotriptic ^[29] . |
| Begoniaceae (01) | |
| <i>Begonia picta</i> Smith. | Leaves and tuber --- India ^[18] . |
| | India: Leaves decoction BD; powder of tuber BD before meal ^[18] . |
| Betulaceae (03) | |
| <i>Betula lenta</i> L. | Leaves decoction --- America ^[12] . |
| <i>Betula pendula</i> Roth. | Leaves / bark infusion --- Bosnia, Herzegovina ^[12] . |
| | Pharmacological activities: Antioxidant ^[14] . |
| <i>Betula utilis</i> D. Don. | Leaves infusion --- India ^[12] . |
| | India: 50 ml leaves infusion TID till stone expulsion ^[20] . |
| | Pharmacological activities: Anti-inflammatory, antioxidant ^[14] . |
| Bignoniaceae (05) | |
| <i>Arrabidaea brachypoda</i> Bureau. | Roots--- Brazil ^[34] |
| <i>Dolichandra unguis-cati</i> (L.) L. G. Lohmann. | Aerial parts infusion or decoction --- Trinidad ^[35] . |
| | Pharmacological activities: Diuretic ^[14] . |
| <i>Kigelia africana</i> (Lam.) Benth. | Fruits --- India ^[36] . |
| | Pharmacological activities: Lithotriptic ^[36] . |
| | Antiuro lithiatic spectrum (reported): Fruits against whewellite ^[22] . |
| <i>Kigelia pinnata</i> (Jacq.) DC. | Fruit pickled in vinegar--- India ^[37] . |
| | Antiuro lithiatic spectrum (reported): Fruits against whewellite ^[37] . |
| <i>Stereospermum chelonoides</i> (L.f.) DC. | Root powder with water or roots decoction --- India ^[38] . |
| | India: 25 – 50 ml of root decoction OD ^[38] . |
| Bombacaceae (02) | |
| <i>Bombax ceiba</i> L. | Bark or fruit powder --- India ^[12] . |
| | India: Dried fruit powder OD in empty stomach till stone expulsion ^[20] . |
| | Pharmacological activities: Analgesic, anti-inflammatory, antioxidant, litholytic ^[14] . |
| | Antiuro lithiatic spectrum (reported): Fruits against whewellite ^[39] . |
| <i>Ceiba pentandra</i> (L.) Gaertn. | Antiuro lithiatic spectrum (reported): Bark against MSUM ^[22] . |
| Bromeliaceae (01) | |
| <i>Ananas cosmosus</i> (Linn.) Merr. | Fruit juice --- India ^[12] . |
| | India: 25-30 ml fruit juice BD till stone expulsion ^[20] . |
| | Pharmacological activities: Antioxidant, diuretic ^[14] . |
| | Antiuro lithiatic spectrum (reported): Fruits against brushite ^[22] . |
| Burseraceae (04) | |
| <i>Boswellia serrata</i> Roxb. ex Colebr. | Antiuro lithiatic spectrum (reported): Gum resin against MSUM ^[22] . |
| <i>Commiphora gileadensis</i> (L.) C. Chr. | Dioscorides (De Materia Medica): Whole plant is diuretic and used against dysuria ^[11] . |
| | Ibn Sina (Al Qanoon Fit Tibb): Gum is litholytic and expels stones ^[11] . |
| <i>Commiphora mukul</i> Engl. | Gum --- Iran ^[12] . |
| <i>Commiphora wightii</i> (Arn.) Bhandari. | Antiuro lithiatic spectrum (reported): Fruit against struvite ^[22] . |
| Cactaceae (01) | |
| <i>Opuntia ficus-indica</i> (L.) Mill. | Dry flower infusion --- Mexico ^[14] . |
| | Pharmacological activities: Diuretic, litholytic ^[14] . |
| Calophyllaceae (01) | |
| <i>Mesua ferrea</i> L. | Flowers --- India ^[29] |
| | Pharmacological activities: Lithotriptic ^[29] . |
| Campanulaceae (01) | |
| <i>Pratia nummularia</i> (Lam.) A. Braun & Asch. | Whole plant --- India ^[12] . |
| Cannabaceae (02) | |
| <i>Cannabis sativa</i> L. | Ibn Sina (Al Qanoon Fit Tibb): Fruits are litholytic and expel stones ^[11] . |
| | Fruit --- Iran ^[12] . |
| | Pharmacological activities: Analgesic, anti-inflammatory ^[14] . |
| <i>Celtis timorensis</i> Span. | Leaves decoction --- India ^[12] . |

| | |
|--|---|
| | India: Boil 10 g of leaves in 2 L of water. 250 ml BD for 10 days ^[20] . Pharmacological activities: Lithotriptic ^[14] . |
| Caprifoliaceae (01) | |
| <i>Lonicera etrusca</i> Santi. | Dioscorides (De Materia Medica): Flower / leaves are diuretic ^[11] . |
| Caricaceae (01) | |
| <i>Carica papaya</i> L. | Roots decoction --- Bangladesh ^[25] , India, Trinidad ^[12, 35] ; seeds powder taken orally --- Palestine ^[40] . |
| | India: Boil 2–6 g of dried root in one L of water. 125 ml OD till stone expulsion ^[38] ; Palestine: 10 g of seeds powder with water orally BD ^[40] . |
| | Pharmacological activities: Lithotriptic ^[29] . |
| | Antiurolithiatic spectrum (reported): Fruits against whewellite ^[41] . |
| Celastraceae (01) | |
| <i>Celastrus paniculatus</i> Willd. | Leaves infusion --- India ^[12] . |
| | India: Crush fresh leaves and mix with curd gives before breakfast and no intake except water up to 3pm. OD till stone expulsion ^[20] . |
| | Pharmacological activities: Analgesic, anti-inflammatory, antioxidant, antispasmodic ^[14] . |
| Clusiaceae (01) | |
| <i>Garcinia pedunculata</i> Roxb. ex Buch.-Ham. | Fruit juice --- India ^[38] . |
| | India: 5–10 ml of fruit juice BD till stone expulsion ^[38] . |
| Combretaceae (04) | |
| <i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr. | Stem bark decoction --- India ^[38] . |
| | India: 30 – 50 ml stem bark decoction BD ^[38] . |
| <i>Terminalia arjuna</i> (Roxb.) Wt. & Arn. | Bark infusion --- India ^[12] . |
| | Pharmacological activities: Analgesic, anti-inflammatory, antioxidant ^[14] lithotriptic ^[29] . |
| | Antiurolithiatic spectrum (reported): Bark plant against brushite and whewellite ^[42] . |
| <i>Terminalia bellirica</i> (Gaertn.) Roxb. | Fruits ---India ^[43] . |
| | Pharmacological activities: Lithotriptic ^[43] . |
| | Antiurolithiatic spectrum (reported): Fruits against whewellite ^[43] . |
| <i>Terminalia catappa</i> L. | Roots --- India ^[38] . |
| <i>Terminalia chebula</i> Retz. | Bark infusion / fruits extract --- India ^[38] . |
| | Pharmacological activities: Lithotriptic ^[44] . |
| | Antiurolithiatic spectrum (reported): Fruits against whewellite ^[22] . |
| Cyperaceae (02) | |
| <i>Cyperus longus</i> L. | Aerial parts decoction --- Turkey ^[12] . |
| | Turkey: A pinch of herb is decocted and 250 ml is taken on an empty stomach ^[45] . |
| | Pharmacological activities: antioxidant, diuretic ^[14] . |
| <i>Cyperus rotundus</i> L. | Dioscorides (De Materia Medica): Roots / rhizome are diuretic and litholytic ^[11] ; Ibn Sina (Al Qanoon Fit Tibb): Fruits / roots are litholytic and expel stones ^[11] . |
| | Rhizome decoction --- Iran ^[12] ; tuber decoction --- India ^[46] |
| | Pharmacological activities: analgesic, anti-inflammatory, antioxidant, antispasmodic, diuretic, litholytic ^[14] . |
| Dracaenaceae (01) | |
| <i>Dracaena angustifolia</i> (Medik.) Roxb. | Tuber --- Vietnam ^[47] . |
| Dryopteridaceae (01) | |
| <i>Dryopteris cochleata</i> (D. Don) C. Chr. | Aerial parts --- India ^[18] . |
| Elaeagnaceae(01) | |
| <i>Elaeagnus angustifolia</i> L. | Barks decoction --- Turkey ^[48] ; fruits decoction--- Turkey ^[49, 50] . |
| | Turkey: 125 ml of bark decoction BD for 20 days ^[48] ; 125 ml of fruits decoction BD for 15 days ^[50] . |
| Gentianaceae (03) | |
| <i>Centaurium erythraea</i> Rafn. | Aerial parts --- Albania ^[51] . |
| <i>Enicostema axillare</i> (Lam.) A. Raynal. | Leaves infusion --- India ^[12] . |
| | Pharmacological activities: Antioxidant ^[14] . |
| <i>Swertia chirata</i> Buch.-Ham. ex Wall. | Stems --- India ^[29] . |
| | Pharmacological activities: Lithotriptic ^[29] . |
| | Antiurolithiatic spectrum (reported): Stems against whewellite ^[52] . |
| Geraniaceae (02) | |
| <i>Geranium robertianum</i> L. | Aerial parts infusion--- Romania ^[53] . |
| | Pharmacological activities: Diuretic ^[14] . |
| <i>Pelargonium graveolens</i> L'Hér. | Stem or petiole/a 3-5 cm part that dipped in olive oil or suppository --- Turkey ^[54] . |
| Gesneriaceae (03) | |
| <i>Coraliodiscus lanuginosus</i> (Wall. ex DC.) B.L. Burt. | Leaves infusion --- India ^[12] . |
| | Pharmacological activities: Antioxidant, diuretic, lithotriptic ^[14] , lithotriptic ^[29] . |
| <i>Didymocarpus pedicellata</i> R.Br. | Antiurolithiatic spectrum (reported): Whole plant against whewellite ^[55] . |
| <i>Didymocarpus tomentosa</i> Wight. | Plant decoction --- India ^[12] . |
| | Pharmacological activities: Anti-inflammatory, antioxidant ^[14] . |
| Grossulariaceae (01) | |
| <i>Ribes triste</i> Pall. | Root decoction --- China ^[56] . |

| | |
|-------------------------------------|--|
| | Pharmacological activities: Lithotriptic ^[14] . |
| Hyacinthaceae (01) | |
| <i>Scilla indica</i> Roxb. | Bulb --- Iran ^[12] . |
| Hydrangeaceae (01) | |
| <i>Hydrangea arborescens</i> L. | Bark infusion --- Canada ^[20] ; roots decoction --- America ^[12] . |
| | Canada: 1/2 - 1 tsp. dried bark in 8 oz. water, cover and keep for 1 h. 4 oz. TID till stone expulsion ^[20] . |
| | Pharmacological activities: diuretic, lithotriptic ^[14] . |
| Hypoxidaceae (01) | |
| <i>Curculigo orchioides</i> Gaertn. | Rhizome decoction --- India ^[12] . |
| | India: 2tsp. of fresh rhizome decoction with 1tsp. of honey. OD for 30 days in empty stomach ^[20] . |
| | Pharmacological activities: Antioxidant, diuretic ^[14] , lithotriptic ^[29] . |
| Iridaceae (02) | |
| <i>Crocus sativus</i> L. | Dioscorides (De Materia Medica): Stigma is diuretic ^[11] ; |
| | Pliny the Elder (Naturalis Historis): Stigma is diuretic ^[11] . |
| | Pharmacological activities: Antioxidant ^[57] , lithotriptic ^[58] . |
| <i>Iris pseudacorus</i> L. | Antiurolithiatic spectrum (reported): Stigma against whewellite ^[58] . |
| <i>Iris pseudacorus</i> L. | Dioscorides (De Materia Medica): Rhizome is diuretic and used against strangury ^[11] . |
| Illecebraceae (01) | |
| <i>Paronychia argentea</i> Lam. | Aerial parts decoction --- Jordan ^[12] , Palestine ^[59] . |
| | Jordan: Boil 150 g plant in one L of water. 150 ml TID till stone expulsion ^[20] . |
| Juglandaceae (01) | |
| <i>Juglans regia</i> L. | Seed decoction --- China ^[56] ; leaves decoction --- Spain ^[60] . |
| | Pharmacological activities: Diuretic, litholytic ^[14] . |

Table 2: Antiurolithiatic plants of revisited families Asteraceae, Fabaceae and Lamiaceae.

| Plants | Explanation |
|--|--|
| Asteraceae (87) | |
| Eighty (80) antiurolithiatic plants have already been discussed ^[3] . The same family was revisited and following seven (07) plants were found. | |
| <i>Calendula arvensis</i> M. Bieb. | Aerial parts decoction --- Italy, Tunisia ^[26] . |
| <i>Carduus acanthoides</i> subsp. <i>acanthoides</i> | Aerial parts decoction --- Turkey ^[48] . |
| | Turkey: 125 ml BD for 10 days ^[48] . |
| <i>Carduus nutans</i> subsp. <i>leiophyllus</i> (Petrovič) Stoj. & Stef. | Aerial parts decoction --- Turkey ^[48] . |
| | Turkey: 125 ml BD for 10 days ^[48] . |
| <i>Carthamus tinctorius</i> L. | Fruit / leaves powder 2 – 4 g orally taken --- India ^[38] . |
| | Antiurolithiatic spectrum (reported): Leaves against whewellite ^[61] . |
| <i>Centaurea hyalolepis</i> Boiss. | Flowers infusion --- Cyprus ^[62] . |
| <i>Helianthus tuberosus</i> L. | Flower or rhizome decoction 250 ml TID--- Turkey ^[63] |
| <i>Onopordium sibthorpiatum</i> Boiss. & Heldr. | Capitulum infusion --- Turkey ^[64] |
| <i>Taraxacum hybernum</i> Steven. | Flowers / leaves raw eaten--- Chile ^[65] . |
| | Pharmacological activities: Litholytic ^[14] . |
| <i>Tessaria integrifolia</i> Ruiz & Pav. | Leaves decoction --- Peru ^[66] . |
| Fabaceae (71) | |
| Sixty four (64) antiurolithiatic plants have already been discussed ^[5] . The same family was revisited and following seven (07) plants were found. | |
| <i>Crotalaria albida</i> Heyne ex Roth. | Roots decoction --- Thailand ^[12] . |
| <i>Crotalaria pallida</i> Ait. | |
| <i>Crotalaria sessiliflora</i> L. | |
| <i>Copaifera langsdorffii</i> Desf. | Leaves ---Brazil ^[67] . |
| | Antiurolithiatic spectrum (reported): Leaves against whewellite ^[67] . |
| <i>Derris trifoliata</i> Lour. | Aerial parts --- India ^[12] . |
| | Pharmacological activities: Diuretic ^[14] . |
| <i>Desmodium microphyllum</i> (Thunb.) DC. | Whole plant decoction --- India ^[12] . |
| | Pharmacological activities: Lithotriptic ^[29] . |
| <i>Spartium junceum</i> L. | Leaves decoction--- Turkey ^[50] |
| | Turkey: 125 ml of leaves decoction with 1 tsp. honey TID before meals for 15 days ^[50] |
| Lamiaceae (58) | |
| Forty seven (47) antiurolithiatic plants have already been discussed ^[7] . The same family was revisited and following eleven (11) plants were found. | |
| <i>Lavandula dentata</i> L. | Flower infusion --- Saudi Arabia ^[68] |
| <i>Lavandula stoechas</i> L. | Leaves decoction --- Palestine ^[69] |
| <i>Origanum majorana</i> L. | Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia): Flowered aerial parts are diuretic ^[70] . |
| | Aerial parts --- Palestine ^[69] |
| <i>Origanum vulgare</i> subsp. <i>hirtum</i> (Link) Ietsw. | Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia): Flowered aerial parts are diuretic ^[70] . |
| | Aerial parts decoction--- Turkey ^[48] |
| | Turkey: 125 ml of aerial parts decoction BD for 7 – 8 days ^[48] . |

| | |
|--|---|
| <i>Rosmarinus officinalis</i> L. | Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia): Flowered aerial parts are diuretic [70]. |
| <i>Salvia officinalis</i> L. | Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia): Flowered aerial parts and leaves are diuretic [70]. |
| <i>Sideritis scardica</i> Griseb. | Aerial parts decoction--- Turkey [48]. |
| | Turkey: 125 ml of aerial parts decoction BD for 7 – 10 days [48]. |
| <i>Teucrium chamaedrys</i> L. | Leaves decoction --- Turkey [48]. |
| | Turkey: 125 ml of aerial parts decoction BD for 10 - 15 days [48]. |
| <i>Teucrium polium</i> L. | Al-Baitar (Kitāb al-Jāmi' li-Mufradāt Al Advia Wal Aghdia): Flowered aerial parts are diuretic [70]. |
| | Aerial parts infusion TID--- Jordan [71, 72]. |
| <i>Thymbra spicata</i> L. | Aerial parts infusion --- Turkey [64]. |
| <i>Thymus longicaulis</i> var. <i>subisophyllus</i> (Borbás) J alas. | Aerial parts decoction --- Turkey [48]. |
| | Turkey: 125 ml of aerial parts decoction BD for 7 - 14 days [48]. |
| <i>Vitex polygama</i> Cham. | Leaves---Brazil [34]. |

References

- Ahmed S, Hasan MM. Antiuro lithiatic plants of Acanthaceae, Amaranthaceae, Amaryllidaceae, Anacardiaceae, Apocynaceae, Arecaceae, Asparagaceae, Aspleniaceae, Caesalpiniaceae, Cappariaceae, Caryophyllaceae, Chenopodiaceae, Cucurbitaceae, Cupressaceae, Ericaceae, Equisetaceae and Euphorbiaceae. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017; 6(8):156-182.
- Ahmed S, Siddiqui MUA, Hasan MM. Globally used antiuro lithiatic plants of family Apiaceae. *World Journal of Pharmaceutical Research*. 2017; 6(7):358-364.
- Ahmed S, Hasan MM, Mahmood ZA. Globally used antiuro lithiatic plants of family Asteraceae: Historical background, mechanism of action, therapeutic spectrum, formulations with doses. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(3):394-402.
- Ahmed S, Hasan MM. A review on globally used antiuro lithiatic monoherb formulations belonging to Boraginaceae, Brassicaceae, Malvaceae and Poaceae families. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017; 6(8):48-61.
- Ahmed S, Hasan MM, Mahmood ZA. Antiuro lithiatic plants of family Fabaceae: A memoir of mechanism of action, therapeutic spectrum, formulations with doses. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(3):592-596.
- Ahmed S, Hasan MM. A comprehensive glimpse on globally used antiuro lithiatic plants of Convolvulaceae, Costaceae, Ebenaceae, Fagaceae, Hypericaceae, Lauraceae, Liliaceae and Lythraceae. *World Journal of Pharmaceutical Research*. 2017; 6(8):224-233.
- Ahmed S, Khatri MS, Hasan MM. Plants of family Lamiaceae: A promising hand for new antiuro lithiatic drug development. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017; 6(7):90-96.
- Ahmed S, Gilani SMU, Hasan MM. Antiuro lithiatic potential of globally used medicinal plants belonging to the family Rosaceae. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(4):1028-1031.
- Ahmed S, Hasan MM. Exploring globally used antiuro lithiatic plants of S to Z families: Including Saxifragaceae, Scrophulariaceae, Solanaceae, Urticaceae, Vitaceae, Zingiberaceae and Zygophyllaceae. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(4):1430-1436.
- Ahmed S, Hasan MM. Exploring globally used antiuro lithiatic plants of M to R families: Including Myrtaceae, Phyllanthaceae, Piperaceae, Polygonaceae, Rubiaceae and Rutaceae. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(5):325-335.
- Ahmed S, Hasan MM, Mahmood ZA. Urolithiasis management and treatment: Exploring historical vistas of Greco-arabic contribution. *Journal of Pharmacognosy and Phytochemistry*. 2016; 5(5):167-178.
- Ahmed S, Hasan MM, Mahmood ZA. Antiuro lithiatic plants: Formulations used in different countries and cultures. *Pakistan Journal of Pharmaceutical Sciences*. 2016; 29(6):2129-2139.
- Ghelani H, Chapala M, Jadav P. Diuretic and antiuro lithiatic activities of an ethanolic extract of *Acorus calamus* L. rhizome in experimental animal models. *Journal of Traditional and Complementary Medicine*. 2016; 6(4):431-436.
- Ahmed S, Hasan MM, Mahmood ZA. Antiuro lithiatic plants: Multidimensional pharmacology. *Journal of Pharmacognosy and Phytochemistry*. 2016; 5(2):4-24.
- Duke JA. *Handbook of Medicinal Herbs*. CRC press, 2002.
- Ahmed A, Wadud A, Jahan N, Bilal A, Hajera S. Efficacy of *Adiantum capillus veneris* Linn in chemically induced urolithiasis in rats. *Journal of Ethnopharmacology*. 2013; 146(1):411-416.
- Ahmed A, Jahan N, Wadud A, Bilal A, Hajera S. *In vitro* effect of hydro alcoholic extract of *Adiantum capillus-veneris* Linn. on calcium oxalate crystallization. *International Journal of Green Pharmacy*. 2013; 7(2):106-110.
- Khajuria AK, Bisht N. Ethnomedicinal plants used to treat Nephrolithiasis: A case study Pauri (PAURI Garhwal), Uttarakhand. *International Journal of Herbal Medicine*. 2017; 5(1):10-13.
- Erdem G, Kesik V, Honca T, Özcan A, Uğuz S, Akgül EÖ *et al.* Antinephrolithiatic activity of *Persea americana* (avocado) and *Viburnum opulus* (guelder rose) against ethylene glycol-induced nephrolithiasis in rats. *African Journal of Traditional, Complementary and Alternative medicines*. 2016; 13(2):110-119.
- Ahmed S, Hasan MM, Mahmood ZA. Antiuro lithiatic plants: Formulations used in different countries and cultures. *Pakistan Journal of Pharmaceutical Sciences*. 2016; 29(6):2129-2139.
- Asif M, Atif M, Malik ASA, Dan ZC, Ahmad I, Ahmad A. Diuretic activity of *Trianthema portulacastrum* crude extract in albino rats. *Tropical Journal of Pharmaceutical Research*. 2013; 12(6):967-972.
- Ahmed S, Hasan MM, Mahmood ZA. *In vitro* urolithiasis models: An evaluation of prophylactic management against kidney stones. *Journal of Pharmacognosy and Phytochemistry*. 2016; 5(3):28-35.

23. Mamillapalli S, Akkiraju PC. A study on nephroprotective and antiurolithiasis activities of ethanolic extract of *Asarum europaeum* leaves against gentamicin induced nephrotoxicity in Wistar rats. *International Journal of Advanced Research*. 2015; 3(7):1241-1247.
24. Vaidyanathan D, Senthilkumar MSS, Basha MG. Studies on ethnomedicinal plants used by malayali tribals in Kolli hills of Eastern ghats, Tamilnadu, India. *Asian Journal of Plant Science and Research*. 2013; 2(6):29-45.
25. Rahmatullah M, Jahan R, Khatun MA, Jahan FI, Azad A, Bashar A *et al.* A pharmacological evaluation of medicinal plants used by folk medicinal practitioners of Station Purbo Para Village of Jamalpur Sadar Upazila in Jamalpur district, Bangladesh. *American Eurasian Journal of Sustainable Agriculture*. 2010; 4:170-195.
26. Leporatti ML, Ghedira K. Comparative analysis of medicinal plants used in traditional medicine in Italy and Tunisia. *Journal of Ethnobiology and Ethnomedicine*. 2009; 5:31.
27. Putri LSE, Dasumiati D, Kristiyanto K, Mardiansyah M, Malik C, Leuvinadrie LP *et al.* Ethnobotanical study of herbal medicine in Ranggawulung Urban Forest, Subang District, West Java, Indonesia. *Biodiversitas Journal of Biological Diversity*. 2016; 17(1):172-176.
28. Hammiche V, Maiza K. Traditional medicine in Central Sahara Pharmacopoeia of Tassili N'ajjer. *Journal of Ethnopharmacology*, 2006. 105:358-367.
29. Chanchal DK, Niranjana P, Alok S, Kulshreshtha S, Dongray A, Dwivedi S. A brief review on medicinal plant and screening method of antilithiatic activity. *International Journal of Pharmacognosy*. 2016; 3(1):1-9.
30. Sridevi K, Ravishankar K, Kiranmayi G. Evaluation of diuretic and anti urolithiatic activity of ethanolic leaf extract of *Basella alba*. *International Journal of Pharmacy*. 2014; 4(1):145-149.
31. Khan SW, Khatoon S. Ethno botanical studies on useful trees and shrubs of Haramosh and Bugrote valleys in Gilgit Notheren areas of Pakistan. *Pakistan Journal of Botany*. 2007; 39(3):699-710.
32. Mohsenzadeh A, Ahmadipour S, Ahmadipour S, Eftekhari Z. A review of medicinal herbs affects the kidney and bladder stones of children and adults in traditional medicine and ethno-botany of Iran. *Der Pharmacia Lettre*. 2015; 7(12):279-284.
33. Joy J, Prathyusha S, Mohanakshmi S, Kumar A, Kumar C. Potent herbal wealth with litholytic activity: a review. *Innovative Drug Discovery*. 2012; 2(2):66-75.
34. Stanifer JW, Kilonzo K, Wang D, Su G, Mao W, Zhang L *et al.* Traditional medicines and kidney disease in low- and middle-income countries: opportunities and challenges. *Seminars in Nephrology*. 2017; 37(3):245-259.
35. Clement Y, Baksh-Comeau Y, Seaforth C. An ethnobotanical survey of medicinal plants in Trinidad. *Journal of Ethnobiology and Ethnomedicine*. 2015; 11(1):67.
36. Gupta AK, Kothiyal P, Pandey S. Evaluation of antiurolithiatic potential of *Kigelia africana* fruits in albino rats. *Fabad Journal of Pharmaceutical Sciences*. 2011; 36:197-205.
37. Kumar R, Kumar T, Kamboj V, Chander H. Pharmacological evaluation of ethanolic extract of *Kigelia pinnata* fruit against ethylene glycol induced urolithiasis in rats. *Asian Journal of Plant Science and Research*. 2012; 2(1):63-72.
38. Kasote DM, Jagtap SD, Thapa D, Khyade MS, Russell WR. Herbasl remedies for urinary stones used in India and China: A review. *Journal of Ethnopharmacology*. 2017; 203:55-68.
39. Gadge NB, Jalalpure SS. Curative treatment with extracts of *Bombax ceiba* fruit reduces risk of calcium oxalate urolithiasis in rats. *Pharmaceutical Biology*. 2012; 50(3):310-317.
40. Jaradat NA, Zaid AN, Al-Ramahi R, Alqub MA, Hussein F, Hamdan Z *et al.* Ethnopharmacological survey of medicinal plants practiced by traditional healers and herbalists for treatment of some urological diseases in the West Bank/Palestine. *BMC Complementary and Alternative Medicine*. 2017; 17:255.
41. Nayeem K, Gupta D, Nayana H, Joshi R. Antiurolithiatic potential of the fruit extracts of *Carica papaya* on ethylene glycol induced urolithiatic rats. *Journal of Pharmacy Research*. 2010; 3:2772-2775.
42. Chaudhary A, Singla SK, Tandon C. *In vitro* evaluation of *Terminalia arjuna* on calcium phosphate and calcium oxalate crystallization. *Indian Journal of Pharmaceutical Sciences*. 2010; 72(3):340-345.
43. Neha U, Kant TS, Anant S, Ankit S, Kumar MS. Anti-urolithiatic effect of *Terminalia bellirica* Roxb. fruits on ethylene glycol induced renal calculi in rats. *Indo American Journal of Pharmaceutical Research*. 2015; 5(5):2031-2040.
44. Pawar AT, Gaikwad GD, Metkari KS, Tijore KA, Ghodasara JV, Kuchekar BS. Effect of *Terminalia chebula* fruit extract on ethylene glycol induced urolithiasis in rats. *Biomedicine and Aging Pathology*. 2012; 2(3):99-103.
45. Akaydin G, Şimşek I, Arituluk ZC, Yeşilada E. An ethnobotanical survey in selected towns of the Mediterranean subregion (Turkey). *Turkish Journal of Biology*. 2013; 37(2):230-247.
46. Kumar SP, Latheef A, Remashree A. Ethnobotanical survey of diuretic and antilithiatic medicinal plants used by the traditional practitioners of Palakkad District. *International Journal of Herbal Medicine*. 2014; 2(2A):52-56.
47. Van Minh V, Nguyen PTT. Medicinal plants used by the Hre community in the Ba to district of central Vietnam. *Journal of Medicinal Plants Studies*. 2014; 2(3):64-71.
48. Kültür Ş. Medicinal plants used in Kırklareli province (Turkey). *Journal of Ethnopharmacology*. 2007; 111(2):341-364.
49. Honda G, Yeşilada E, Tabata M, Sezik E, Fujita T, Takeda Y *et al.* Traditional medicine in Turkey VI. Folk medicine in West Anatolia: Afyon, Kütahya, Denizli, Muğla, Aydın provinces. *Journal of Ethnopharmacology*. 1996; 53(2):75-87.
50. Ugulu I, Baslar S, Yorek N, Dogan Y. The investigation and quantitative ethnobotanical evaluation of medicinal plants used around Izmir province, Turkey. *Journal of Medicinal Plants Research*. 2009; 3(5):345-367.
51. Mustafa B, Hajdari A, Krasniqi F, Hoxha E, Ademi H, Quave CL *et al.* Medical ethnobotany of the Albanian Alps in Kosovo. *Journal of Ethnobiology and Ethnomedicine*. 2012; 8(1):6.
52. Parmar R, Kachchi N, Targar P, Desai T, Bhalodiya P. Preclinical evaluation of antiurolithiatic activity of *Swertia chirata* stems. *International Research Journal of Pharmacy*. 2012; 3(8):198-202.

53. Tita I, Mogosanu GD, Tita MG. Ethnobotanical inventory of medicinal plants from the South-West of Romania. *Farmacia*. 2009; 57(2):141-156.
54. Güzel Y, M Güzelşemme, M Miski. Ethnobotany of medicinal plants used in Antakya: a multicultural district in Hatay Province of Turkey. *Journal of Ethnopharmacology*. 2015; 174:118-152.
55. Baheti D, Kadam S. Antiuro lithiatic activity of some traditional medicinal plants against calcium oxalate induced urolithiasis in rats. *International Journal of Pharmaceutical, Chemical and Biological Sciences*. 2013; 3(4):1276-1285.
56. Duke J, Ayensu E. Medicinal plants of China. Michigan: Reference Publications Algonac, MI, 1985.
57. Ghaeni FA, Amin B, Hariri AT, Meybodi NT, Hosseinzadeh H. Antilithiatic effects of crocin on ethylene glycol-induced lithiasis in rats. *Urolithiasis*. 2014; 42(6):549-558.
58. Amin B, Feriz HM, Hariri AT, Meybodi NT, Hosseinzadeh H. Protective effects of the aqueous extract of *Crocus sativus* against ethylene glycol induced nephrolithiasis in rats. *EXCLI Journal*. 2015; 14:411-422.
59. Azaizeh H, Saad B, Khalil K, Said O. The state of the art of traditional Arab herbal medicine in the Eastern region of the Mediterranean: a review. *Evidence-Based Complementary and Alternative Medicine*. 2006; 3(2):229-235.
60. Blanco E, Macia M, Morales R. Medicinal and veterinary plants of El Caurel (Galicia, northwest Spain). *Journal of Ethnopharmacology*. 1999; 65(2):113-124.
61. Al-Snafi. Medicinal plants with anti-urolithiatic effects (part 1). *International Journal of Pharmacy*. 2015; 5(2):98-103.
62. Broderstad M, Metcalfe I. Medicinal Plants. In: Cyprus Wild Flowers: Searachable database of Wild flowers of Cyprus. [cited 2017 15th July]; Available from: [www.cypruswildflowers.com\(http://cypruswildflowers.com/cgi-bin/site/main.pl?action=medicinal\)](http://www.cypruswildflowers.com(http://cypruswildflowers.com/cgi-bin/site/main.pl?action=medicinal)). 2017.
63. Güneş S, Savran A, Paksoy MY, Koşar M, Çakılıcıoğlu U. Ethnopharmacological survey of medicinal plants in Karaisalı and its surrounding (Adana-Turkey). *Journal of Herbal Medicine*. 2017; 8:68-75.
64. Bulut G, Haznedaroğlu MZ, Doğan A, Koyu H, Tuzlacı E. An ethnobotanical study of medicinal plants in Acipayam (Denizli-Turkey). *Journal of Herbal Medicine*, 2017.
65. Martinez M, Poirrier P, Chamy R, Prüfer D, Schulze-Gronover C, Jorquera L *et al.* *Taraxacum officinale* and related species-An ethnopharmacological review and its potential as a commercial medicinal plant. *Journal of Ethnopharmacology*. 2015; 169(1):244-262.
66. De Feo V. Medicinal and magical plants in the northern Peruvian Andes. *Fitoterapia*. 1992; 63(5):417-440.
67. Brancalion AP, Oliveira RB, Sousa JP, Groppo M, Berretta AA, Barros ME *et al.* Effect of hydroalcoholic extract from *Copaifera langsdorffii* leaves on urolithiasis induced in rats. *Urological Research*. 2012; 40(5):475-481.
68. Rahman MA, Mossa JS, Al-Said MS, Al-Yahya MA. Medicinal plant diversity in the flora of Saudi Arabia 1: a report on seven plant families. *Fitoterapia*. 2004; 75(2):149-161.
69. Abu-Rabia A. Herbs as a food and medicine source in Palestine. *Asian Pacific Journal of Cancer Prevention*. 2005; 6(3):404-407.
70. El-Gharbaoui A, Benítez G, González-Tejero MR, Molero-Mesa J, Merzouki A. Comparison of Lamiaceae medicinal uses in eastern Morocco and eastern Andalusia and in Ibn al-Baytar's Compendium of Simple Medicaments (13th century CE). *Journal of Ethnopharmacology*. 2017; 202:208-224.
71. Aburjai T, Hudaib M, Tayyem R, Yousef M, Qishawi M. Ethnopharmacological survey of medicinal herbs in Jordan, the Ajloun Heights region. *Journal of Ethnopharmacology*. 2007; 110(2):294-304.
72. Hudaib M, Mohammad M, Bustanji Y, Tayyem R, Yousef M, Abuirjeie M *et al.* Ethnopharmacological survey of medicinal plants in Jordan, Mujib Nature Reserve and surrounding area. *Journal of Ethnopharmacology*. 2008; 120(1):63-71.