

**A Review of Moroccan Medicinal Plants Used in the Treatment of
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Abstract

In Morocco, surveys on the medicinal plants used in the treatment of urolithiasis have been carried out by various researchers during ethnobotanical missions.

The main objective of this work is to contribute to the knowledge of medicinal plants used in the treatment of this disease in Morocco in order to help in the formulation of improved traditional medicines.

Data concerning the use of medicinal plants against urolithiasis are gathered together from published documents concerning the various ethnomedicinal surveys conducted in Morocco for synthesis and analysis. In total, 82 species of plants belonging to 42 families are recorded to be used by the Moroccan population to treat urolithiasis. Apiaceae, Lamiaceae, Leguminosae and Poaceae are the most represented families. The most cited plant species are *Petroselinum crispum* and *Citrus limon*. Many parts of the plant are used, especially the use of the seeds and leaves are the most used parts. Decoction and infusion are the most common methods of preparation of these plants for utilisation.

Morocco has an important floristic biodiversity in terms of antilithiasic plants. These results form the basis of subsequent studies aimed at experimentally evaluating the potential of these plants.

Key Words: Medicinal plants, Urolithiasis, Ethnopharmacology, Antilithiasic effect, Morocco

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1. Introduction

Medicinal plants have been used since antiquity to relieve and cure human illnesses. In fact, their therapeutic properties are due to the presence of hundreds, even thousands, of bioactive natural compounds called: secondary metabolites. These are then accumulated in different organs and sometimes in specialized cells of the plant. Despite the progress of pharmacology, in the absence of a modern medical system, the

therapeutic use of medicinal plants is quite common in some countries of the world and especially in developing countries.

Urolithiasis is the third most common disorder of the urinary tract, after infections and pathological disorders of the prostate (Delfan et al., 2015). Urinary stone formation affects 10–12% of the population in industrialized countries (Atmani and Khan, 2000, Butterweck and Khan, 2009, Dayapule et al., 2021). Urolithiasis is the presence of hard crystals in the urinary tract (bladder,

urethra or ureters). They vary greatly in size, with diameters ranging from a few millimeters to several centimeters, but there are several calculation methods. The most common (80%) are calcium oxalate (CaOx) stones formed by deposits of calcium, phosphates and oxalates which eventually take the form of a stone which can lead to severe pain. Kidney stone formation is a complex process resulting from the succession of several physicochemical events, including supersaturation, nucleation, growth, aggregation and retention in the renal tubules, but the mechanisms of these processes are not exactly understood (Atmani et al., 2004a; Atmani and Khan, 2000, Atmani et al., 2004b). These stones can persist for an indefinite period and have serious consequences for the life of the patient (Kumari et al., 2016). Unfortunately, despite considerable advances in medical treatment, there are no satisfactory drugs to treat kidney stones (Atmani and Khan, 2000; Atmani et al., 2003; Butterweck and Khan, 2009; Fouada et al., 2006). In some cases, it is necessary to break the stone or resort to surgery to remove it. In addition to the high cost of the surgery, various side effects, such as urinary tract infections, are expected (Atmani et al., 2004a; Delfan et al., 2015). Because there is no suitable medical treatment for these disorders, it is imperative to search for new or lesser-known medicinal plants that could be a potential source for new bioactive compounds with a therapeutic value. Thus, in Morocco, as in many countries, most patients use medicinal plants as an alternative therapy for many diseases, including urolithiasis.

2. Ethnobotanical studies

In Morocco, several ethnobotanical surveys have been carried out to identify the medicinal plants used to treat urolithiasis. However, no systematic study has yet been conducted to introduce different herbs used to treat kidney stones in different regions of

Morocco. This study aims to systematically introduce medicinal plants from different regions of Morocco that are reported to be effective against urolithiasis according to ethnobotanical documents. This was carried out by searching studies in Google, Google Scholar, PubMed, Medline, Science Direct, Researchgate, and other online databases.

The results obtained made it possible to identify 82 medicinal plants, used in Morocco to treat urolithiasis, the majority of which correspond to spontaneous plants. These are divided into 42 families. The most represented families are Apiaceae (10 species), Lamiaceae (7 species), Leguminosae (6 species), Poaceae (6 species), Compositae (4 species), Amaryllidaceae (3 species), Brassicaceae (3 species), Euphorbiaceae (3 species), Rosaceae (3 species), Anacardiaceae (2 species), Caryophyllaceae (2 species), Juncaceae (2 species) and Ranunculaceae (2 species). The other remaining families have only one species.

Analysis of the information collected shows that 17 medicinal plants are the most used in the Morocco (Table 1). The species *Petroselinum crispum* and *Citrus limon* were used in four different regions. *Atriplex halimus*, *Apium graveolens*, *Opuntia ficus-indica*, *Herniaria hirsuta*, *Euphorbia falcata*, *Crocus sativus*, *Glycyrrhiza glabra*, *Linum usitatissimum*, *Olea europaea*, *Cynodon dactylon*, *Hordeum vulgare*, *Zea mays*, *Ziziphus lotus*, *Urtica urens* and *Vitis vinifera* were used in three different regions. The rest of the medicinal plants reported in Table 1, were only used in one or two regions.

Several parts of the listed plants are utilized. The results obtained show that seed and leaf are the most used parts by the population.

Several methods of preparation are used by the Moroccan population to treat urolithiasis. The data analysis showed that the decoction is the most used method of preparation,

followed by the infusion and then by the powder.

Ethnobotanical surveys carried out with the aim of listing antilithiasic medicinal plants in different regions of Morocco underline the importance of this plant heritage in the traditional pharmacopoeia and in particular in the treatment of urolithiasis.

During an ethnobotanical survey in the province of Tan-Tan (southern Morocco), 50 plant species belonging to 29 families were recorded as remedies used by the local population to treat kidney stones. The most represented family is that of the Apiaceae. The results of the study showed that the leaf and the seed are the most used parts. The decoction is the most used method of preparation (Ghourri et al., 2013).

An ethnobotanical study of medicinal plants used in the treatment of genitourinary diseases was carried out between 2016 and 2018 in the Rif region (Northern Morocco). A total of 548 local traditional healers were interviewed. The survey identified 27 species of medicinal plants belonging to 18 botanical families. Medicinal plants are mostly used in the treatment of kidney stones (Chaachouay et al., 2020).

Another ethnobotanical study of medicinal plants traditionally used in the treatment of urolithiasis was conducted in 2013–2014 on the population of Rabat, Salé and Temara. This study showed 35 plant species used in the treatment of kidney stones. The most cited plant species are *Herniaria hirsuta*, *Petroselinum crispum*, *Zizyphus lotus* and *Citrus limon* (Khouchlaa et al., 2017).

A study that we recently carried out in the province of Tarfaya identified 40 medicinal plants, divided into 27 families, used by the local population for the treatment of urolithiasis. Apiaceae, Lamiaceae, Leguminosae and Poaceae are the most represented families. As for the dominant species, there are essentially *Herniaria*

hirsuta, *Anastatica hierochuntica*, *Apium graveolens*, *Zizyphus lotus*, *Allium sativum* and *Ranunculus muricatus* (Idm'hand et al., 2019).

Information on the use of these plants as reported by local people is given in Table 1.

3. Pharmacological studies

Several studies show that medicinal plants have a beneficial effect in case of urolithiasis. However, their mechanisms of action are not fully understood. Some of them help prevent the formation and especially recurrence of kidney stones, while others facilitate the excretion of wastes by the kidneys or inhibit the formation and aggregation of calcium oxalate crystals. (Aggarwal et al.; 2014, Atmani, 2003; Grases et al., 2009). In Morocco, 82 plants have been inventoried as antilithiasis, but only a few have been scientifically evaluated. Indeed, experimental work has been carried out in order to verify the antilithiasis activity of some of these plants, as well as the active compounds responsible for this activity. These are *Atriplex halimus*, *Pistacia lentiscus*, *Ammi visnaga*, *Ammodaucus leucotrichus*, *Coriandrum sativum*, *Daucus carota*, *Foeniculum vulgare*, *Petroselinum crispum*, *Phoenix dactylifera*, *Opuntia ficus-indica*, *Herniaria hirsuta*, *Citrullus lanatus*, *Crocus sativus*, *Cicer arietinum*, *Trigonella foenum-graecum*, *Punica granatum*, *Cynodon dactylon*, *Hordeum vulgare*, *Zea mays*, *Adiantum capillus-veneris*, *Nigella sativa* and *Malus pumila*.

The antilithiasic activity of some plants has also been proven experimentally. This is the case of the species mentioned below:

Herniaria hirsuta has a prophylactic effect against the formation of calcium oxalate-based stones (the most frequent stones) (Atmani et al., 2003). *In vitro*, an extract of *Herniaria hirsuta* promoted the nucleation of calcium oxalate crystals, increasing their number but reducing their size (Atmani and

Khan, 2000). In vivo, administration of *Herniaria hirsuta* extract to rats reduced the deposition of calcium oxalate crystals in the kidneys (Atmani et al., 2004).

Cynodon dactylon extracts showed a beneficial effect on the prevention and elimination of calcium oxalate deposits in the rat kidney (Atmani et al., 2009, Rad et al., 2011). Administration of hydroalcoholic extract of *Cynodon dactylon* reduced the growth of urolithiasis in rats (Khajavi Rad et al., 2011). These results provide scientific substantiation for the roles of *Cynodon dactylon* in the prevention and treatment of kidney stones in humans.

Treatment of rats with aqueous and ethanolic extracts of *Nigella sativa* significantly reduced the number and size of calcium oxalate deposits in the kidneys. It also reduced the concentration of calcium oxalate in urine. This beneficial action can be attributed to the antioxidant and anti-inflammatory activities of *Nigella sativa* extract (Hadjzadeh et al., 2011; Khoei et al., 2009).

Administration of *Hordeum vulgare* seed extract reduced the growth of kidney stones in rats. It seems that the treatment effect is more effective than preventive. The mechanism of action could be due to its

diuretic effect, its antioxidant power, its nephroprotective property and its ability to decrease the concentration of kidney stone constituents (Shah et al., 2012).

In vivo experiments have shown that aqueous and n-butanol extracts of *Phoenix dactylifera* at a dose of 200 mg/kg possess antiurolithiatic activities (Reddy and Vardhaman, 2013). Therefore, it can be suggested that the aqueous extract or other products of *Phoenix dactylifera* can be used for the prevention and treatment of urolithiasis in humans; further studies are needed to clarify the mechanism.

Indeed, some plants that we have noted open up promising prospects in the search for new active ingredients, thus being able to provide new economically beneficial and socially important products by producing effective and low-cost drugs for the treatment of urolithiasis.

Indeed, additional research on the inventoried plants is necessary in order to better determine the active compounds responsible for their activities and to evaluate their effectiveness. After the positive effects of these plants are proven to be true, it is possible to produce useful drugs in the treatment and control of kidney stones.

Table 1. List of plants used in the treatment of urolithiasis in Morocco

Family	Scientific name	Local name	Used part	Preparation	RFC*	Previous ethnobotanical studies	Previous pharmacological studies
Amaranthaceae	<i>Atriplex halimus</i> L.	Legtef	Leaf	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Beghalia et al., 2009)
Amaryllidaceae	<i>Allium ampeloprasum</i> L.	Borro	Bulb	Decoction	0.25	(Khouchlaa et al., 2017)	-
	<i>Allium cepa</i> L.	Lbaesla	Bulb	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Allium sativum</i> L.	Touma	Bulb	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Anacardiaceae	<i>Pistacia atlantica</i> Desf.	Igg	Seed	Decoction	0.25	(Idm'hand et al., 2019)	-

	<i>Pistacia lentiscus</i> L.	Drou	Leaf	Infusion	0.25	(Chaachoua y et al., 2020)	(Cheraft-Bahloul et al., 2017)
Apiaceae	<i>Ammi visnaga</i> (L.) Lam	Bûšnîkha	Flower	Decoction	0.25	(Ghourri et al., 2013)	(Khan et al., 2001)
	<i>Ammodaucus leucotrichus</i> Coss. & Dur	Kmoun reg	Seed	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Beghalia et al., 2009)
	<i>Apium graveolens</i> L.	Lkrafes	Seed	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
	<i>Conium maculatum</i> L.	Choukran	Leaf	Poultice	0.25	(Chaachoua y et al., 2020)	-
	<i>Coriandrum sativum</i> L.	Lqezbor	Leaf	Decoction	0.25	(Khouchlaa et al., 2017)	(Chandrasekaran and Veerasamy, 2018)
	<i>Daucus carota</i> L.	Khizzou	Seed	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Bawari et al., 2018)
	<i>Eryngium triquetrum</i> Vahl	Zreyga	Leafy stem	Decoction	0.25	(Ghourri et al., 2013)	-
	<i>Foeniculum vulgare</i> Mill.	Nafaa	Seed	Infusion	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Ibrahim and El-Khateeb, 2013)
	<i>Petroselinum crispum</i> (Mill.) Fuss	Maadnous	Leafy stem	Decoction	1	(Chaachoua y et al., 2020; Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	
	<i>Pimpinella anisum</i> L.	Habbat hlaoua	Seeds	-	0.25	(Chaachoua y et al., 2020)	-
Apocynaceae	<i>Caralluma europaea</i> (Guss.) N.E.Br.	Daghmous	Latex	Raw	0.5	(Chaachoua y et al., 2020; Khouchlaa et al., 2017)	-
Arecaceae	<i>Phoenix dactylifera</i> L.	Tmer	Fruit	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Reddy and Vardhaman, 2013)
Aristolochiaceae	<i>Aristolochia baetica</i> L.	Berztam	Leaf	Poultice	0.25	(Chaachoua y et al., 2020)	-
Boraginaceae	<i>Borago officinalis</i> L.	Lhamhem	Flower	Infusion	0.25	(Chaachoua y et al., 2020)	-
Brassicaceae	<i>Anastatica hierochuntica</i> L.	Lkemcha	Leafy stem	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Lepidium sativum</i> L.	Hab rchad	Seed	Raw	0.5	(Ghourri et al., 2013;	-

						Idm'hand et al., 2019)	
	<i>Raphanus raphanistrum subsp. sativus</i> (L.) Domin	Lefjel	Seed	Raw	0.25	(Khouchlaa et al., 2017)	-
Burseraceae	<i>Commiphora africana</i> (A.Rich.) Endl.	Oumm ennas	Gum	Powder	0.25	(Ghourri et al., 2013)	-
Cactaceae	<i>Opuntia ficus-indica</i> (L.) Mill.	Aknari	Flowers	Powder	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Touiti et al., 2020)
Capparaceae	<i>Capparis spinosa</i> L.	Lkbbbar	Fruit	Powder	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Caryophyllaceae	<i>Herniaria hirsuta</i> L.	Harasst lhjar	Whole plant	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Atmani et al., 2004a)
	<i>Spergularia rubra</i> (L.) J.Presl & C.Presl	Harasst lhjar	Whole plant	Decoction	0.25	(Chaachouay et al., 2020)	-
Cistaceae	<i>Cistus populifolius</i> L.	Irgel	Seed	Decoction	0.25	(Idm'hand et al., 2019)	-
Compositae	<i>Artemisia herba-alba</i> Asso	Chih	Seed	Decoction	0.25	(Khouchlaa et al., 2017)	-
	<i>Asteriscus graveolens</i> (Forssk.) Less	Tafsa	Flowers	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Chamaemelum nobile</i> (L.) All.	Babounj,	Stem	Decoction	0.25	(Khouchlaa et al., 2017)	-
	<i>Taraxacum campylodes</i> G.E.Haglund	Oudjem	Leaf	Infusion	0.25	(Khouchlaa et al., 2017)	-
Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Dellah	Fruit	Raw	0.25	(Khouchlaa et al., 2017)	(Siddiqui et al., 2018)
Euphorbiaceae	<i>Euphorbia falcata</i> L.	Hayyat noufous	Whole plant	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
	<i>Euphorbia granulata</i> Forssk.	Kbidet eddobb	Root	Powder	0.25	(Ghourri et al., 2013)	-
	<i>Mercurialis annua</i> L.	Harrigua melsa	Leafy stem	Decoction	0.25	(Khouchlaa et al., 2017)	-
Iridaceae	<i>Crocus sativus</i> L.	Zaafraan	Stigmat	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Amin et al., 2015)
Juncaceae	<i>Juncus acutus</i> L.	Smaar	Seed	Decoction	0.25	(Khouchlaa et al., 2017)	-
	<i>Juncus maritimus</i> Lam.	Smaar	Seed	Decoction	0.25	(Ghourri et al., 2013)	-

Lamiaceae	<i>Lavandula angustifolia</i> Mill.	Lkhzama	Flower	Infusion	0.25	(Chaachoua y et al., 2020)	-
	<i>Lavandula dentata</i> L.	Lkhozama lbeldiya	Leafy stem	Decoction	0.25	(Ghourri et al., 2013)	-
	<i>Lavandula multifida</i> L.	Khilt lkheyl	Leafy stem	Decoction	0.25	(Ghourri et al., 2013)	-
	<i>Origanum compactum</i> Benth.	Azokenni	Leaf	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Ocimum basilicum</i> L.	Lahbak	Aerial part	Decoction	0.25	(Idm'hand et al., 2019)	-
	<i>Rosmarinus officinalis</i> L.	Lyazir	Leaf	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Thymus broussonetii</i> Boiss.	Tazoukennit	Leaf	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Lauraceae	<i>Cinnamomum verum</i> J.Presl	Lqerfa	Bark	Powder	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Leguminosae	<i>Cassia fistula</i> L.	Lkharoub lhindi	Fruit	Decoction	0.25	(Ghourri et al., 2013)	-
	<i>Cicer arietinum</i> L.	Lhemees	Fruit	Decoction	0.5	(Chaachoua y et al., 2020; Khouchlaa et al., 2017)	(Biglarkhani et al., 2019)
	<i>Glycyrrhiza glabra</i> L.	Arq souss	Root	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
	<i>Medicago sativa</i> L.	Lfessa	Seed	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Ononis natrix</i> L.	Hannet reg	Leafy stem	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
	<i>Trigonella foenum-graecum</i> L.	Lhelba	Seed	Maceration	0.25	(Khouchlaa et al., 2017)	(Laroubi et al., 2007)
Linaceae	<i>Linum usitatissimum</i> L.	Zariit lkettan	Seed	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
Lythraceae	<i>Punica granatum</i> L.	Remman	Bark	Infusion	0.25	(Khouchlaa et al., 2017)	(Rathod et al., 2012)
Molluginaceae	<i>Corrigiola litoralis</i> subsp. <i>telephiiifolia</i> (Pourr.) Briq.	Sarghina	Whole plant	Decoction	0.25	(Chaachoua y et al., 2020)	-
Myristicaceae	<i>Myristica fragrans</i> Houtt	Lgouza	Fruit	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-

Myrtaceae	<i>Syzygium aromaticum</i> (L.) Merr. & L.M.Perry	Lqronfel	Cloves	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Oleaceae	<i>Olea europaea</i> L.	Zaytoune	Fruit	Raw	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
Papaveraceae	<i>Papaver rhoeas</i> L.	Belaaman	Stem	Decoction	0.25	(Khouchlaa et al., 2017)	-
Pedaliaceae	<i>Sesamum indicum</i> L.	Jenjlane	Seed	Infusion	0.25	(Chaachouay et al., 2020)	-
Poaceae	<i>Cynodon dactylon</i> L. Pers	Njem	Rhizome	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Rad et al., 2011)
	<i>Festuca glauca</i> Vill.	Agouzmir	Seed	Infusion	0.25	(Chaachouay et al., 2020)	-
	<i>Hordeum vulgare</i> L.	Zraa	Seeds	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Shah et al., 2012)
	<i>Saccharum officinarum</i> L.	Kasab sokkar	Stem	Juice	0.25	(Khouchlaa et al., 2017)	-
	<i>Stipagrostis pungens</i> (Desf.) De Winter	Ssbet	Leaf	Decoction	0.25	(Ghourri et al., 2013)	-
	<i>Zea mays</i> L.	Dra	Stigmat	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	(Grases et al., 1993)
Pteridaceae	<i>Adiantum capillus-veneris</i> L.	Qzibra	Whole plant	Powder	0.25	(Ghourri et al., 2013)	(Ahmed et al., 2013)
Ranunculaceae	<i>Nigella sativa</i> L.	Sanouj	Seeds	Powder	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	(Khoei et al., 2009)
	<i>Ranunculus muricatus</i> L.	Wden lhalouf	Root	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Rhamnaceae	<i>Ziziphus lotus</i> (L.) Lam.	Seder	Leaf	Powder	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019, Khouchlaa et al., 2017)	-
Rosaceae	<i>Malus pumila</i> Mill.	Teffah	Bark	Decoction	0.25	(Khouchlaa et al., 2017)	(Sinha and Tagore, 2010)
	<i>Prunus cerasus</i> L.	Hab lmlouk	Fruit	Decoction	0.25	(Khouchlaa et al., 2017)	-
	<i>Prunus domestica</i> L.	Lberqouq	Gum	Infusion	0.25	(Ghourri et al., 2013)	-

Rutaceae	<i>Citrus limon</i> (L.) Osbeck	Lhamed	Fruit	Juice	1	(Chaachouay et al., 2020; Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
Urticaceae	<i>Urtica urens</i> L.	Lhorriyga	Whole plant	Decoction	0.75	(Chaachouay et al., 2020; Ghourri et al., 2013; Idm'hand et al., 2019)	-
Theaceae	<i>Camellia sinensis</i> (L.) Kuntze	Atay	Leaf	Decoction	0.5	(Ghourri et al., 2013; Idm'hand et al., 2019)	-
Thymelaeaceae	<i>Thymelaea lythroides</i> Barratte & Murb.	Metnan	Leaf	Decoction	0.25	(Khouchlaa et al., 2017)	-
Vitaceae	<i>Vitis vinifera</i> L.	Zbib	Fruit	Decoction	0.75	(Ghourri et al., 2013; Idm'hand et al., 2019; Khouchlaa et al., 2017)	-
Xanthorrhoeaceae	<i>Aloe vera</i> (L.) Burm.f.	Aloe vera	Gel	Juice	0.25	(Khouchlaa et al., 2017)	-
Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Skenjbir	Root	Maceration	0.25	(Khouchlaa et al., 2017)	-

*RFC : Relative Frequency of Citation

4. Conclusion

In conclusion, the review of the literature of medicinal plants of Morocco reported in various research documents showed that 82 species of plants are used against urolithiasis of which 17 of them are more used, therefore more important. Nevertheless, several plants have not been the subject of a scientific investigation in the laboratory to finally justify their biological activities against urolithiasis. Therefore, studies are needed to better promote the use of medicinal plants in Morocco.

This study constitutes a useful documentation, which can contribute to preserve the knowledge on the use of the medicinal plants and to valorize them in order to discover new natural active compound usable in pharmacology for the treatment of the urinary urolithiasis.

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Author Contribution

Elhassan IDM'HAND wrote the paper.

Conflicts of Interest

No conflict of interest was reported by the author.

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