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Nephroprotective Agents Used in Unani Medicine-An Evidence Based Approach

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Abstract

Kidney is the main excretory organ of the body responsible to excrete the waste, undesirable and toxic substances out of the body. A number of drugs are excreted out of the body through kidney, thus it always remains in direct contact with substances of aversive nature which make it susceptible to toxicity and injury as some substances have inherent noxious effect on kidney such as penicillin and some deposits in tubules that impair its function like gentamicin. This is the main lacuna of Western medicine that it provides inarguably relief to the diseased organ but makes some healthy organ diseased. However, in Unani system of medicine many herbs and their formulations are used to cure kidney disorders since millennia without any side effects. So, in this review an attempt has been made to discuss about commonly used nephroprotective agents of Unani system of medicine.

Keywords: Sodium set point; Dialysate sodium; Plasma sodium

Introduction

According to Avicenna, tonics are described as a drug which moderates the disposition and temperament of an organ to an extent so that it resists the superfluous matter and disorders moving towards it, this action is elicited either by its inherent property or by its moderate temperament which cools what is warm and warms what is cold. Galen explained the action of rose oil on these lines [1]. Muqawwi Gurda wa Masana (Insigurating tonics) are drugs that possesses nephroprotective effect. These drugs act as tonics to kidney and bladder e.g. Amla (*Emblica officinalis*), Anar (*Punica granatum Linn*), Izkhar (*Cymbopogon jwarancusa*), Afsanteen (*Artemisia absinthium*), Darchini (*Cinnamomum zeylanicum*) and Kuchla (*Strychnos nux-vomica Linn*) are muqawie masana (tonic to bladder) that is they strengthen the kidneys and bladder [2]. Unani system of medicine possesses many effective and safe diuretics and nephroprotective drugs which are useful in renal disorders. Diuresis is the core and most important function of kidney. Mudirre baul advia (Diuretics) possess very mild warmth (*latif hararath*), which is sufficient for the kidneys to absorb the water molecules, these drugs are supportive to quwwathe mumaiza which helps in separating the water molecules [3]. Mudirre baul advia act on the urinary tract at various sites and increase the formation of urine but the mechanism of action of these drugs are different from each other. Some drugs while passing through kidneys act locally by stimulating and increasing the local blood circulation, resulting in local vascular congestion and thereby increasing the volume of urine flow e.g. Shora qalmi (Potassium nitrate), Javakhar (Potassium carbonate/potash), Kabab chini (*Piper cubeba*), while other drugs increase the general blood circulation by acting on blood vessels and thereby increase the flow of urine like sharbat, qahva etc.; several drugs act by relieving the retention of urine while some act on the blood vessels of other parts of the body and viscera and transport the fluids for elimination through kidneys while other drugs have the capability to form the appropriate Johare azae bole e.g. Karafs, badiyan, duqoo, tukhme gazar dashti etc. [3]. The leaf juice of Turb or Raphanus sativus is prescribed in difficulty in passing urine as well as in the obstruction of urinary passage. Root juice of the same is used in urinary troubles and seeds are found to be effective in increasing the excretion [4]. The roots of *Taraxacum officinale* are used in chronic disorders of kidney [4]. The decoction of whole plant Satavar (*Asparagus racemosus*) is used in the ailment of kidney. Seeds of Reehan (*Ocimum sanctum*) are useful in complaints of urinary system [4]. Sahajna (*Moringa olifera*) with a little opium, Giloo (*Tinospora cordifolia*) are useful in the inflammation of kidney [4]. The seeds of Tukhm Shibbat (*Peucedanum graveolens*) commonly known as Dill fruit are reported to be antidysenteric, diuretic, carminative, emmenagogue, galactagogue, and resolvent [5-8]. The seeds of Gazar (*Daucus carota*) commonly known as carrot are considered to be nervine tonic, a decoction of the seeds is said to be lithotriptic, diuretic, aphrodisiac, emmenagogue, demulcent and diaphoretic [5,6,7,9]. The seeds of Nankhah (*Trachyspermum ammi*) commonly known as Ajwain have been reported to be carminative, digestive, appetizer, diuretic and emmenagogue [1,5,7,10]. The seeds of Kharpazah (*Cucumis melo*) are reported to be diuretic, detergent, demulcent, lithotriptic, further used as cooling medicine in burning micturition and oliguria [6,7,9,11]. The seeds of Khayar (*Cucumis sativus*) cures stranguray, thirst; the seeds are used in painful micturition and oliguria and in promoting the passage of calculi [6,7,9,11]. Rhubarb (*Rheum emodi*) has been traditionally used as diuretic [12]. "Bisheri Booti." (*Aerva lanata*) is used by the inhabitants in nephrological disorders [13,14]. Following is the list of the herbal drugs which have been documented for possible uses in nephrotoxic disorders in the Unani literature [7] (Table 1).

S. No	Name	Scientific name	Family	Part used	Action	Constituents	References
1.	Jau (Barley)	*Hordeum vulgare* Linn. (Figure 1)	Gramineae; Poaceae	Dried fruit	Detergent	Vitamin C, potassium, superoxide dismutase.	[7,15-17]
2.	Amaltas	*Cassia fistula* Linn. (Figure 2)	Caesalpiniaceae	Whole plant	Antiseptic, lithortriptic	Anthraquinone glycosides, sennosides A, formic acid, butyric acid.	[7,15-17]
3.	Ananas	*Ananas sativus* (Figure 3)	Bromeliaceae	Fruit	Diuretic	Proteins, sugar, vitamin C	[18]
4.	Persiao-sshan	*Adiantum capillus* veneris (Figure 4)	Adiantaceae	Fern	Diuretic	Flavonoid, glucosides, rutin, isoquercetin, kaempferol; terpenoids.	[7,16,18,19]
5.	Baadiyaan	*Foeniculum vulgare* Mill (Figure 5)	Umbelliferae; Apiaceae	Seed	Diuretic, lithotriptic	Volatile oil, fenchone and methylchavicol, flavonoid.	[7,16,19]
6.	Behi	*Pyrus cydonia* (Figure 6)	Rosaceae	Fruit	Diuretic	Sugar, vitamin C, tartaric acid, glycoside.	[16,18]
7.	Biskhapra	*Boerhaavia diffusa* (Figure 7)	Nyctaginea	Whole plant	Diuretic	Alkaloid trianthemine, nicotinic and ascorbic acid.	[15,18]
8.	Izkhar	*Andropogon jwarancusa* (Figure 8)	Poaceae	Whole plant	Diuretic, lithotriptic	Piperitone, borneol, cadinene, camphene, camphor, farnesene, geraniol.	[15,16,18]
9.	Kasni	*Cichorium intybus* (Figure 9)	Compositae; Asteraceae	Whole plant	Diuretic, lithotriptic, antiseptic	Inulin, sesquierpene lactones, coumarins (chicoriin, esculetin, esculin, umbelliferone and scopoletin).	[15,18]
10.	Kulthi	*Dolichos biflorus* (Figure 10)	Papilionacea; Fabaceae	Seed	Lithotriptic	Pentosan, vitamin A, vitamin C, phytosterols.	[15,16]
11.	Kharkhask	*Tribulus terristeris* (Figure 11)	Zygophyllaceae	Fruit.	Diuretic	Diosgenin, gitogenin, chlorogenin, ruscogenin, rutin, kaempferol.	[15-17]
12.	Kaaknaj	*Physalis alkekengi* (Figure 12)	Solanaceae	Berries	Diuretic	Flavonoids, including luteolin-glucoside and with steroids.	[15-17]
13.	Tukhm Khayar	*Cucumis sativus* (Figure 13)	Cucurbitaceae	Seed	Diuretic, cooling	Rutin; glucosides including cucurbitaside.	[15,18]
14.	Tukhm Kaddu	*Cucurbita moschata* (Figure 14)	Cucurbitaceae	Seed	Diuretic, cooling	Glycerides, sterol esters, phosphatidylcholine and phosphatidylinositol.	[15,16,18]
15.	Tukhm Kharpazah	*Cucumis melo* (Figure 15)	Cucurbitaceae	Seed	cooling	Volatile oil.	[15-17]
16.	Tukhm Gazar	*Daucus carota* (Figure 16)	Umbelliferae; Apiaceae	Seed	Diuretic	Betacarotene, flavones, Flavonols and glycosides.	[15,18]
17.	Karafs	*Apium graveolens* (Figure 17)	Umbelliferae; Apiaceae.	Seed	Diuretic, lithotriptic	Limonene, a-p-dimethyl styrere, N-pertyl benzene, caryophyllene, a-selinene.	[15,16,18]
18.	Turb	*Rafanus sativus* (Figure 18)	Cruciferae; Brassicaceae	Whole plant	Diuretic		[18]
19.	Revand chini	*Rheum emodi* (Figure 19)	Polygonaceae	Root	Diuretic	Emodin, emodin monomethyl ether, aloe-emodin, rhein.	[15,16,18]
20.	Khas	*Andropogon muricatus* Retz. (Figure 20)	Graminae	Whole plant	refrigerant, febrifuge, antispasmodic	Essential oil, sesquiterpenoids.	[15,20]

21.	Mocharas	*Bombax ceiba* L.	Bombacaceae	Fruit, root, gum, bark	Diuretic.	Betasitosterol and its glucosides, lupeol, 7-hydroxycadalene.	[15,20]
22.	Mazereon	*Clitoria ternatea* Linn. (Figure 21)	Papilionacea; Fabaceae	Root	Diuretic	Cinnamic acid, flavonol, glycosides of kaempferol.	[15,20]
23.	Sapistan	*Cordia dichotoma* Forst (Figure 22)	Boraginaceae	Fruit	Diuretic	Alpha-amyrin and taxifolin-3, 5- dirhamnoside.	[15,20]
24.	Asl-us-soos	*Glycyrrhiza glabra* Linn. (Figure 23)	Papilionacea; Fabaceae	Root	Diuretic	Glycyrrhizin, chalcones, isoflavonoids, coumarins, triterpenoids and sterols, volatile oils.	[15,18,20]
25.	Gul-e-Surkh	*Rosa damascena* Mill. (Figure 24)	Rosaceae	Flower	Cooling, refrigerant	Quercetin, kaempferol, cyaniding, essential oil with citronellol, nerol, geraniol, beta-phenylethanol and its glucoside.	[15,20]
26.	Hammaaz.	*Rumex vesicarius* Linn. (Figure 25)	Polygonacea	Plant, Seed	Diuretic	Anthraquinone glucosides, emodin and chrysophanol, vitamin C.	[15,20]
27.	Baamiyaa	*Abelmoschus esculentus* (Linn.) Moench. (Figure 26)	Malvaceae	Fruit, seed, root	Diuretic	Quercetin, hyperin (hyperoside), proanthocyanidins.	[15,20]
28.	Ghunchi	*Abrus precatorius* Linn. (Figure 27)	Papilionacea; Fabaceae	Root, leaves	Uterine stimulant	Abrin, toxalbumin, indole derivatives, anthocyanins, sterols.	[15,20]
29.	Kanghi	*Abutilon indicum* Linn. Sweet (Figure 28)	Malvaceae	Root, bark seed	Diuretic	Mucilage, tannins, asparagines, gallic acid and sesquiterpenes.	[15,20]
30.	Aqaaqia	Indica Benth. (Figure 29)	Mimosaceae	Bark, pods	Anti-inflammatory	Tannin, galactose; l-arabinose, l-rhamnose and aldobiouronic acid.	[15,20]
31.	Chirchitaa.	Achyranthes aspera Linn. (Figure 30)	Amaranthaceae	Whole plant	Diuretic	Alkaloids achyranthine and betaine, tannins and glycosides.	[15,20]
32.	Piyaaz	Allium cepa Linn. (Figure 31)	Liliaceae; Alliaceae	Bulb	Anti-spasmodic, diuretic	Volatile oil, flavonoids, sterols, allyl-propyl-disulphide.	[15,20]
33.	Chaulai	*Amaranthus spinosus* Linn. (Figure 32)	Amaranthaceae.	Whole plant	Spasmolytic, diuretic	Sterols, alpha-spinasterol and hentriacontane.	[15,20]
34.	Tabaashir	*Bambusa bambos* (L.) Voss. (Figure 33)	Gramineae; Poaceae	Whole plant	Cooling, antiinflamma-tory	Cyanogenic glucoside—taxiphyllin. Bamboo-manna contains silicious crystalline substances.	[15,20]
35.	Dhaak	*Butea monosperma* (Lam.) Taub.	Papilionacea; Fabaceae	Whole plant	Diuretic	Flavonoids, glucosides- butin, butrin, isobutrin and palastrin.	[15,20]
36.	Bathuaa	*Chenopodium album* Linn (Figure 34)	Chenopodiaceae.	Leaves	Diuretic	Ascaridole, saponins. Cryptomeridiol.	[15,20,21]
37.	Brahmi	*Centella asiatica* (Linn.) (Figure 35)	Umbelliferae; Apiaceae	Whole plant	Diuretic	Brahmine, herpestine, saponins, monnierin, hersaponin.	[15,22]
38.	Bakaayan	*Melia azedarach* Linn. (Figure 36)	Meliaceae.	Leave, flower, fruit	Diuretic	Bakayanin, lactone, bakalactone, quercitrin, rutin.	[15,22]
39.	Gilo	*Tinospora cordifolia* (Figure 37)	Menispermaceae.	Stems	Diuretic	Berberine; tinosporon, tinosporic acid, tinosporol.	[15,22]

40.	Ginger	*Zingiber officinale* Rosc.	Zingiberaceae	rhizome	Diuretic.	Essential oil, mono-terpenes, sesquiterpenes, Gingerol and shogaol.	[15,22-24]
41.	Chal Sandal Safed	*Santalum album* Linn	Santalaceae	Bark	Cooling, diuretic, urinary antiseptic	Triterpene, alpha-and beta-santalol, alpha-, beta-,epibeta-santalene and alpha-and betacurcumene .	[15,23]
42.	Zard Chob.	*Curcuma longa*	Zingiberaceae	Rhizome	Diuretic	Curcumin, mono-desmethoxy-curcumin, ketones, sugars, starch.	[15,25]
43.	Sataavar	*Asparagus racemosus*	Asparagaceae	Root	Diuretic	Saponins—shatavarins I–IV. Shatavarin IV.	[15,25]
44.	Tulasi	*Ocimum sanctum* Linn	Labiatae; Lamiaceae	Whole plant	antispasmodic	eugenol, carvacrol, nerol and eugenolmethyl ether, ursolic acid, apigenin.	[15,22,26]
45.	Hinaa	*Lawsonia inermis* Linn.	Lythraceae	Leaves	antispasmodic	Naphthoquinones, flavonoids, luteolin and its 7-O-glucoside.	[15,22]
46.	Manjeeth	*Rubia cordifolia* Linn	Rubiaceae	Stem, root, leaves, seed	Diuretic, deobstruent	Anthraquinones and their glycosides, munjistin, xanthopurpurin, peudopurpurin.	[15]
47.	Naishakar	*Saccharum officinarum* Linn	Gramineae; Poaceae	Juice of stem	Cooling, diuretic	Sucrose, glucose and fructose, asparagine and glutamine.	[15]
48.	Miswaak	*Salvadora persica* Linn	Salvadoraceae.	Whole plant	Diuretic, lithotriptic	Monoclinic sulphur, benzyl glucosinolate, salvadourea, m-anisic acid and sitosterol.	[15]
49.	Mouz	*Musa paradisiaca* Linn. (Figure 38)	Musaceae	Rhizome, pulp of fruit.	Lithotriptic	Acylsterylglycoside, sitoindoside IV, pectin, uronic acid.	[15]
50.	Baobarang	*Embelia ribes* Burm.	Myrsinaceae	Root, seed	Diuretic	Quinines- embelin, rapanone, homoembelin, homorapnone, vilangin	[15]

Table 1: Drugs having nephroprotective activities.

Figure 1: *Hordeum vulgare Linn.*

Figure 2: *Cassia fistula.*

Figure 3: *Ananas sativus.*

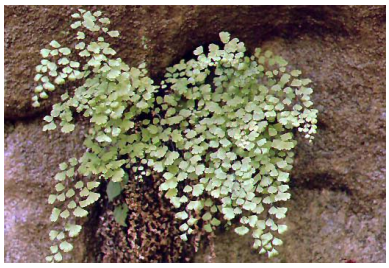

Figure 4: *Adiantum capillus* veneris.

Figure 5: Foeniculum *vulgare.*

Figure 6: *Pyrus cydonia.*

Figure 7: *Boerhaavia diffusa.*

Figure 8: *Andropogon jwarancusa.*

Figure 9: *Cichorium intybus.*

Figure 10: *Dolichos biflorus.*

Figure 11: *Tribulus terristeris.*

Figure 12: *Physalis alkekengi.*

Figure 13: *Cucumis sativus.*

Figure 14: *Cucurbita moschata.*

Figure 15: *Cucumis melo.*

Figure 16: *Daucus carota.*

Figure 17: *Apium graveolens* seed.

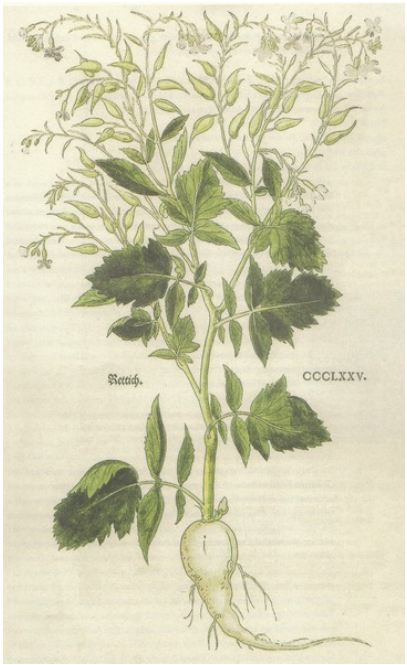

Figure 18: *Rafanus sativus.*

Figure 19: *Rheum emodi.*

Figure 20: *Andropogon muricatus* Retz.

Figure 21: *Clitoria ternatea* Linn.

Figure 22: *Cordia dichotoma* Forst.

Figure 23: *Glycyrrhiza glabra.*

Figure 24: *Rosa damascena* Mill.

Figure 25: *Rumex vesicarius* Linn.

Figure 26: *Abelmoschus esculentus.*

Figure 27: *Abrus precatorius* Linn.

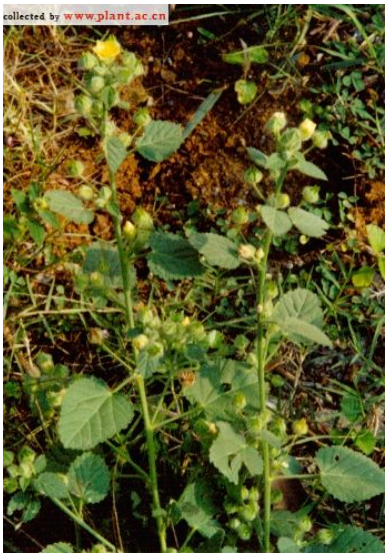

Figure 28: *Abutilon indicum* Linn.

Figure 29: *Acacia arabica* wild.

Figure 30: *Achyranthes aspera*.

Figure 31: *Allium cepa*.

Figure 32: *Amaranthus spinosus* Linn.

Figure 33: *Bambusa bambos*.

Figure 34: *Chenopodium album* Linn.

Figure 35: *Centella asiatica*.

Figure 36: *Melia azedarach* Linn.

Figure 37: *Tinospora cordifolia.*

Figure 38: *Musa paradisiaca.*

Recent Pharmacological Studies

Cucumis sativus

In a study renal calculi were induced in the rats by 0.75% V/V ethylene glycol treatment. Systematic study was conducted to see the influence of the extract of the fruits of *Cucumis sativus* when used as preventive and curative regimens for treatment in urolithiasis in albino rats. Various biochemical estimations in serum, urine, kidney homogenates and histological examination of the kidneys showed that the test extract has beneficial action in urolithiasis when given in preventive and curative regimens [27].

Cichorium intybus

Noori et al. [28] evaluated the role of herbal plant *Cichorium intybus* on Cisplatin – induced toxicity. 24 male Albino Wistar rats were randomly divided into 4 groups: Group I was termed as untreated control; Group II was Cisplatin control and received 3 mg/kg b.w.; i.p.; Group III received C. intybus ethanolic extract at a dose of 500 mg/kg b.w. orally for 10 consecutive days and Group IV is Cisplatin + *C. intybus* pretreated group. *C. intybus* is given 30 minutes prior to Cisplatin. Cisplatin – induced electrolytes disturbances is indicated by increase Intra - erythrocyte sodium content, decreased plasma magnesium, calcium and Intra-erythrocyte Na+-K+-ATPase which implicates the renal toxicity. At a dose of 500 mg/kg b.w. of *C. intybus* pretreatment showed partial counter action on the electrolytes imbalances and Na+-K+-ATPase activity. Results reported the protective role of *Cichorium Intybus* in Cisplatin induced nephrotoxicity.

Cucumis melo

A scientific study was carried out by Fahmiya et al. to evaluate the nephroprotective activity of methanolic extract of *Cucumis melo* (ME-CM) seed kernel in gentamicin-induced nephrotoxicity. The ME-CM was administrated orally (190 mg/kg/d) for 8 days. Gentamicin was administrated at the dose of 100 mg/kg daily in neck region subcutaneously from 4th to 8th day. Gentamicin (alone) treated group showed increased levels of blood urea nitrogen and serum creatinine, which were significantly retrieved in group pretreated with ME-CM. The study revealed that the level of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx) and reduced glutathione (GSH) were increased with decrease in malondialdehyde (MDA) content in ME-CM pretreated group when compared with gentamicin alone treated group. The histopathological analysis also showed the protective nature of ME-CM in gentamicin-induced renal damage [29].

Angelica radix

A poly herbal formulation was studied for its protective effect on mice administered with 3 mg/kg of Cisplatin. Among the ingredients of the formulation *Angelica radix* was more effective and it showed strongest protective effect against the toxicity, the effectiveness of *Angelica radix* was found to be due to its constituent L- malate which was isolated and tested for nephroprotective activity [30].

Cordyceps sinesis

The simultaneous administration of the plant *Cordyceps sinesis* with gentamicin protects the proximal tubular cells from gentamicin toxicity. The use of *Cordyceps sinesis* after establishment of Kanamycin induce acute renal failure reduced the recovery time significantly compared to control group [31].

Boerhavvia diffusa

Results are reported on the clinical, experimental and immunological studies on (*Boerhavvia diffusa*) the observations reveal equivalent diuretic effect of frusemide, Biskhapra increases serum protein level and decreases urinary protein excretion in patients of nephritic syndrome. Increase was also noted in the level of immunoglobulin and lower immune complexes after one month of medication in patients of nephritic syndrome. Clinically Biskhapra was

proved to be useful and safe drug in patients of nephritic syndrome [32].

Tripterygium wilfordii and *Radix salivae*

Tripterygium wilfordii polyglucoside 20 mg/kg combined with *Radix salivae* mithiorrhizae 6-5 gm/kg for treating purpuric nephritis (group A), compared with the control group of using *Tripterygium wilfordii* poly glucoside treatment only (group B). The average time of oedema disappearing and blood pressure resuming to normal range in 8 days in group A which were much better than those in group B, it indicates the effect of group A was much better [33].

Tribulus terresteris

Simultaneous administration of Gokhroo (*Tribulus terresteris*) 200 mg/kg/day/orally and gentamicin to female rats decreased the gentamicin induced nephrotoxicity in both structural and functional terms. The effects were comparable to that of Verapamil [34]. Methanolic extract of Icacina tricantha tuber was found to be effective in carbon tetra chloride induced nephrotoxicity. The rats treated only with carbon tetra chloride lost weight, but those with carbon tetra chloride and extract gained weight. Histopathological examination of the kidney revealed complete protection against carbon tetra chloride induced nephrotoxicity [35].

Echinacea pallid

The hydro alcohol standardized extract of *Echinacea pallida* given to mice in association with the intraperitoneal administration of cisplatin exhibited protective effect expressed by a diminished loss and fast recovery of the animal's body weight, pretreatment with *Echinacea pallida* also decreased cisplatin nephrotoxicity estimated from the level of kidney homogenate oxygen consumption [36].

Withania somnifera

The protective effect of Asgandh (*Withania somnifera*) on Cadmium induced toxicity in mice kidney has been studied, aqueous extract of 40 mg/0.1 ml concentration was prepared from the dried roots of asgandh mice were fed with Cadmium chloride along with Asgandh extract and asgandh extract alone (1.14 gm/kg body weight) for 20 days. Results based on lipid peroxidation indicate that asgandh is capable of reducing toxicity caused by cadmium [37].

Apium graveolens

The dried ripe fruits of Tukhm Karafs (*Apium graveolens*) the seeds are reported to be stimulant, aromatic, emmenagogue and diuretic, Beekh Karafs (the roots of karafs) are also reported to be appetizer, carminative, lithotriptic, diuretic, emmenagogue, deobstruent, frequently used in dropsy, anuria, kidney and vesical calculi and amenorrhoea [1,7-9].

Panax ginseng

The protective effect of two natural antioxidants ginsenoside Rb-I and quercetin isolated from *Panax ginseng* on acute nephrosis induced by Puromycin Amino nucleoside has been reported. The protective action of Rb-I and quercetin were evidenced by their ability to suppress the formation of phosphatidylcholine hydro peroxide in the plasma, liver and kidney. Another beneficial effect noted from these natural antioxidants was increased glutathione peroxidase activity in the blood. The severity of Puromycin Amino nucleoside induced acute nephrosis was found to be ameliorated by the anti-oxidative action of these two flavonoids [38].

Geranium humbergii

Effects of Geranin tannin extracted from the herb *Geranium humbergii* on Puromycin Amino nucleoside nephrosis were studied in rats. The urine protein excretion in female rats (140-160 gm) receiving puromycin amino nucleoside on 7th day, reached its maximum after injection of puromycin amino nucleoside injection on 14th day, but in animals treated intramuscularly with geranin 10 mg/kg body weight the urinary protein was reduced approximately 35%. The increase in serum cholesterol and lipid peroxide produced by puromycin amino nucleoside were also suppressed by geranin, observation by electron microscopy revealed that the degree of abnormality in glomerular epithelial cells was lower in rats treated with geranin after the puromycin amino nucleoside injection than in the rats treated with the puromycin amino nucleoside alone [39].

Other studies

In a study two formulations NR- AG I containing (*Crateava nurvala*, *Dolichos biflorus*, *Tribulus terristeris*, *Shilagi*), and NRAG 2 containing (*Crateava nurvala*, *Boerrhavia diffusa*, *Sacharum officinarum*, *Butea frondosa*) were administered in male albino rats along with Gentamicin, biomedical studies indicated the gentamicin (80mg/kg sc/day) causes significant renal damage which was prevented by both the formulations [40]. Two Unani compound formulations Jawarish Zarooni sada and Banadequl Buzoor have been reported to possess nephroprotective activity. The formulation was found to decrease the serum urea and serum creatinine levels significantly; this was increased by the administration of Gentamicin [41-44].

Conclusion

It is obvious from present review that there are numerous herbal drugs which are being used by Unani physicians in the form of single as well as compound formulations since centuries. These drugs are safe, effective and free from adverse effects. Some studies have been conducted on these drugs but they lack extensive pharmacological and clinical studies. Hence it is suggested that relevant studies may be carried out on these natural resources for the establishment of new, safe and effective nephroprotective agents. This review provides new vistas for researcher and scientist.

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