

Promoting Urinary Tract Health with Select Botanicals and Minerals

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The kidneys function in the removal of excess liquid and wastes from the blood, which in turn is excreted in the form of urine. They also function to maintain a balance in salts and other blood derived substances, and to secrete the hormones erythropoietin, which aids in the formation of red blood cells, and calcitriol, 1,25[OH]₂ Vitamin D₃, the active form of vitamin D.

Under normal circumstances urine is a sterile liquid. However, bacteria may inhabit any portion of the urinary tract; the kidneys, urethra, ureters, or bladder, resulting in an infection. Typically, infections of the urinary tract involve only the lower segment—the urethra and the bladder, with more serious consequences resulting as the bacteria travel upward towards the kidney. Urinary tract infections (UTIs) are recognized as the second most common type of bodily infection.¹ Women are especially prone to UTIs, for reasons that are currently not well understood. Herbal components and specific minerals are well recognized as assistants in promoting therapeutic relief for urinary tract complications, and provide support for other components of the urinary system as well. Select herbs and minerals, with their distinct characteristics in supporting urinary health, are described below.

Chrysanthemum (*Chrysanthemum indicum*) – Although typically used as a tonic, Chrysanthemum is considered to have both antispasmodic and diuretic effects, with the fresh flowers demonstrating antibacterial effects.² Phytochemically, it possesses flavonoids, terpenoids and phenolic compounds.³ It also contains the essential oils α -pinene, limonene, carvone, cineol, camphore and bornel, as well as the glucosides chryanthinin, chrysanthemaxanthin, and yejuhualactone.⁴

In an animal model, Chrysanthemum extract was shown to inhibit proliferation and induce apoptosis in synovial cells, resulting in a therapeutic effect.⁵ A separate study demonstrated the anti-inflammatory properties of chrysanthemum extract, which was evidenced by its inhibition of the production of nitric oxide, PGE₂, TNF-alpha and interleukin-1 beta. It was also shown to suppress the nuclear translocation of NF-kappaB, which was correlated to an inhibitory effect on the phosphorylation of NF-kappaB,⁶ thus displaying a positive effect on inflammation. In the Chinese classification it is described as bitter-tasting herb, which aids in fever reduction, has detoxifying properties, and is distinguished as both an eliminator of moisture and a reducer of swelling.⁷

Buchu (*Barmosa betulina*) - In South Africa Buchu is used as a general tonic and medicine, specifically for stomach problems, rheumatism and bladder problems.⁸ Traditional use is as an antispasmodic, an antipyretic, an antiseptic, a limiment, a cough remedy, a diuretic, and for the treatment

of colds and flu. It also has demonstrated antibacterial and antifungal actions, and is considered an antiseptic for the urinary tract.⁹ The essential oil has demonstrated activity against *Staphylococcus aureus*, *Bacillus cereus*, *Klebsiella pneumoniae* and *Candida albicans*.^{10,11,12} Its essential oils are reported as borneol, 1,8-cineole, linalool, eugenol, and α -pinene. Another chief component is its high level of monoterpenes, which reportedly are active against bacteria. In addition to these actions, it has also been reported to possess anti-inflammatory properties, via its inhibitory action on 5-lipoxygenase (5-LOX) *in vitro*, which in turn blocks the synthesis of 5-LOX products, thus inhibiting leukotriene synthesis.¹⁰ Of note is to recognize that Buchu may cause stomach upset or diarrhea,²¹ and should be used cautiously along with cardiac glycosides, as it may have an additive effect in coagulation reduction (blood thinning effect).¹³ It is also recommended that liver function be monitored with use, due to potentially hepatotoxic effects.²¹ Additionally, Buchu is associated with increased menstrual flow and may be an abortifacient, thus, as with most herbs, is not recommended during pregnancy.

Polyporus umbellatus – *Polyporus umbellatus* is a saprophytic mushroom, recognized for its medicinal attributes. Its major compounds include ergosterol, polyporosterones A-G, and polysaccharides.¹⁴ It is well-known for its strong diuretic action, demonstrated to increase urinary output by as much as 62%.¹⁵ Its diuretic effect is assumed to be due to the inhibition of renal reabsorption of the electrolytes sodium, potassium and chloride. It is also said to possess immune stimulating properties⁴ and to offset immunosuppression.¹⁶

Cornsilk (*Zea mays*) - Cornsilk contains both volatile oils and flavonoids. The volatile oils include carvacrol, alphaterpineol, menthol and thymol, while the flavonoids include maysin and maysin-3'-ethyl ether. In addition to these it also contains saponins, tannins, sterols, and alkaloids. Its properties are said to be detoxifying and relaxing, and it possesses diuretic activity. Its traditional use is for disorders of the urinary tract.¹⁷ It has also been demonstrated in cell culture studies to possess 'TNF antagonistic activity' by virtue of its inhibition of both TNF- and LPS-induced leukocyte adhesiveness of endothelial cells to monocytes, thus is speculated to be involved in leukocyte TNF- and LPS-mediated adhesion and trafficking.¹⁸ It is also promoted as a beneficial component to aide in the reduction of frequent urination caused by irritation of the bladder, as well as a treatment for bedwetting problems.¹⁹

Couch grass (*Agropyron repens*) – The traditional use of Couch Grass is for the treatment of urinary tract, bladder, and kidney complications.²⁰ In terms of urinary infection, it has been utilized as a beneficial adjunct in inflammation of the bladder (cystitis), urethra (urethritis), and prostate (prostatitis). It is alleged to possess demulcent properties, which function in soothing irritation and inflammation. It is also said to have a medicinal action on the urinary mucosa, and is particularly effective for children's conditions and for helping to manage examples of tension in the urinary system, such as enuresis and nervous incontinence. It is noted as

possessing diuretic properties, which have been attributed to its high percentage of mannitol, as well to the presence of inulin, saponins and vanillin.²¹ In addition to these, it also contains a high percentage of silica. The mucilage polysaccharide has also been implicated with possessing a soothing action on inflammation and irritation, and may serve to elicit a comforting action with bladder spasms.²¹ Cautions should be exercised when using Couch grass at high doses for extended periods as hypokalemia (decreased blood potassium levels) or hypotension may result as a consequence of its diuretic properties.²² Additionally, Couch grass should be avoided in patients who have edema caused by heart or kidney disease.

In addition to botanicals, select minerals are also noted to have beneficial attributes for urinary support.

Zinc – Zinc has noted immune enhancing properties, demonstrated in animal studies to decrease lipid peroxidation, as well as to improve antioxidant status.²³ In animal studies, a deficiency in zinc was noted to affect the morphology of epithelial cells in the urinary tract, resulting in an increased thickness in the transitional epithelium cells.²⁴ A separate animal study examining the effects of zinc administration prior to renal ischemia noted a significant reduction in the increased levels of reactive substances during ischemia-reperfusion, and an increase in the level of metallothionein compared to control, thus implying that zinc's antioxidant effect is mediated via metallothionein induction.²⁵

Calcium – Calcium in the form of glycerophosphate supplies both calcium and phosphorous in a ratio of 19% to 14%, respectively. Unlike many forms of calcium, this form is very soluble in the presence of acids. Its action is proposed to act as a base agent in lowering the pH of foods to a neutral level, and was demonstrated to lower the pH of common acidic foods, including tomato and fruit juice, by as much as 99%. With the use of calcium glycerophosphate in patients with bladder or pelvic discomfort and pain (interstitial cystitis), a reduction in both urinary urgency and in the level of pain and discomfort when eating acidic foods (up to 70%) was noted.²⁶ In a prospective, nonrandomized study examining the efficacy of calcium glycerophosphate, supplementation was demonstrated to aide in reducing the symptoms associated with bladder or pelvic discomfort and pain (interstitial cystitis) in patients ingesting foods that exacerbated these symptoms. Using the Likert scales, a decrease in pain and discomfort was noted (from 5.3 to 3.6), as well as a decrease in urgency (from 5.3 to 4.1) following ingestion.²⁷ Calcium glycerophosphate appears to reduce bladder discomfort and pain in patients with food- or fluid-related symptom exacerbations.

Ammonium chloride – Ammonium chloride is considered an acidifying diuretic, in addition to its properties as an expectorant and a diaphoretic (increases perspiration).²⁸

UTIs occur in all age populations, as well as in both males and females. Disorders that suppress the immune system, as well as those with specific conditions, including diabetes, are

at an increased risk for the incidence of UTIs. Taken together, the above noted botanicals and minerals serve to support the urinary system, and due to the antimicrobial nature of the herbs, may decrease the incidence of urinary tract infections.

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