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## EDITORIAL

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# Effective Use of Herbal Medicine in Urinary Tract Infections

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**ABSTRACT.** Urinary tract infections (UTI), acute and chronic, can be effectively treated with herbal medicine. Two strategies are essential in utilizing herbal medicine. The choice of herbs, through their herbal actions, along with appropriate therapeutic dosing strategies, will determine the effectiveness of herbal treatment and prevent the need to intervene with antibiotics. This paper will discuss urinary tract infections and botanical therapeutics through a case-study presentation.

**KEYWORDS.** Aquaretic/diuretic, Antimicrobial/antiseptic, Arbutin/Hydroquinone, Demulcent, Andoyne, Antispasmodic, Immunostimulation/Immunomodulation, Lymphagogue, Glomerular Filtration Rate (GFR), Antidiuretic Hormone (ADH), Trophorestorative

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## HERBAL ACTIONS

The primary herbal actions to be considered when formulating for urinary tract infection (UTI) are aquaretic/diuretic, antimicrobial/antiseptic, demulcent, anodyne/antispasmodic, and immune stimulating herbs. Immune modulating and tonic herbs, specific and non-specific, are important adjuvants.

### AQUARETIC OR DIURETIC HERBS

Many herbs will have *aquaretic or diuretic* action. Following are the four mechanisms for increasing urinary output in the body:

- Increased glomerular filtration rate (GFR).
- Increased sodium and chloride excretion.
- Increased osmotic pressure.
- Decreased antidiuretic hormone (ADH).

Different herbs will bring about diuretic action through different mechanisms. Methyl xanthine or purine alkaloid containing plants, including *Camellia sinensis* (tea), *Coffea arabica* (coffee), *Paullinia cupana* (guarana), and *Ilex paraguensis* (mate) will increase blood flow to the kidney, thereby increasing GFR. *Taraxacum officinalis* (dandelion) leaf, known for increasing sodium and chloride excretion, supplies potassium, sparing potassium in its diuretic action. *Betula pendula* (birch leaf) and *Juniperus communis* (Juniper berries) also work through increasing sodium and chloride excretion. Other herbs with a high potassium to sodium ratio are *Urtica dioica* (nettles), *Equisetum arvense* (horsetail), *Matricaria recutita* (Chamamile), and *Tilia cordata* (Linden tree). *Urtica dioica* and *Equisetum arvense* are considered tonic herbs to the system due to their high mineral content and astringent tannins. Due to the nonmetabolized sugars, sorbitol, mannitol, and inositol, osmotic pressure will increase, yielding an osmotic diuretic action. *Zea mays* (corn silk) and *Elymus repens* (couch grass) will also have this effect. The primary interference with ADH comes from alcohol, which brings ADH down, thus increasing diuresis.

In cases of renal failure and diabetes, all herbal diuretics are contraindicated.

### ANTIMICROBIAL OR ANTISEPTIC HERBS

Antimicrobial or antiseptic herbs play an essential role in assisting the body to resolve UTI. The hydroquinones, primarily from arbutin,

found in *Arctostaphylos uva ursi* (Bearberry) and *Chimaphila umbellata* (pipsissewa), will convert in the presence of bacteria and yield the antiseptic action. Other herbs contain volatile oils, yielding both specific and nonspecific antimicrobial action. Some key herbs high in volatile oils with some specificity to the urinary tract include *Agathosma betulina* (Buchu), *Gaultheria procumbens*, *Thymus vulgaris*, *Apium graveolens*, and *Juniperus communis* (Juniper). *Achillea millefolium* (yarrow) and act as an antimicrobial and inflammation modulator. *Usnea spp* (Old Man's Beard) is a lichen containing usnic acid with powerful antimicrobial action.

In addition to the antimicrobial action of herbs, *Vaccinium macrocarpon* (cranberry) can be used both preventively and during an acute UTI. Its mechanism of action appears to be the inhibition of adhesion of bacteria to the mucosa walls through the fructose and proanthocyanidins compounds (Lynch, 2004).

### DEMULCENTS

There are two herbs *Zea mays* (corn silk) and *Elymus repens* (couch grass) high in mucopolysaccharides that bring demulcent action specifically to the urinary tract. The cooling and mucous membrane-soothing qualities of the demulcent herbs decrease inflammation and ease any irritation along the membrane walls. Other demulcent herbs that can be effectively used are *Althaea officinalis* (marshmallow), *Malva sylvestris* (mallow), and *Ulmus fulva* (slippery elm). *Glycyrrhiza glabra* (licorice root) acts as a demulcent and has the ability to prolong the half-life of cortisol, thus yielding inflammation-modulating and adrenal-support actions.

### ANODYNE/ANTISPASMODIC

Herbal medicine with anodyne action can be effective in decreasing pain, although not to the degree of pharmaceutical pain medication. Two key anodyne herbs are *Corydalis formosa* (turkey corn) and *Piscidia erythrina* (Jamaican dogwood). *Corydalis* is the most valued herb for pain in the materia medica of Traditional Chinese Medicine (Tierra, 1998). A member of the Papaveraceae family, the Papaveraceae type alkaloids, a group of almost 20 being isolated, are the primary active constituents that bring the analgesic action (Bone, 1996). It is a complex combination of isoflavones

that appear to yield the anodyne action of *Piscidia* (Mills & Bone, 2005).

Both *Corydalis* and *Piscidia* bring antispasmodic action as part of the relief of pain. Other antispasmodic herbs to consider are *Viburnum opulus* (cramp bark), *Lobelia inflata* (Indian tobacco), and *Ammi visnaga* (khella). *Piper methysticum* (kava) will bring about relaxation with some antispasmodic effects. *Gelsemium semperivirens* is a low-dose herb with effective antispasmodic action, although it is to be used only by trained professionals.

### INFLAMMATION MODULATION

Several inflammation-modulating herbs also act with analgesic effects through salicylic acid, including *Salix spp* (willow), *Populus spp* (poplar), and *Filipendula ulmaria* (meadowsweet). *Glycyrrhiza glabra* will modulate inflammation by prolonging the half-life of cortisol, the body's endogenous inflammation modulating agent. *Curcuma longa* (turmeric), *Dioscorea villosa* (wild yam), and *Matricaria recutita* (chamomile) will all yield inflammation-modulating effects in the body by their action through the liver.

### IMMUNOMODULATION

In acute UTI, immunostimulation will increase the production of macrophage activity, diminishing bacterial presence. *Echinacea spp* can be considered as an immune stimulant due to its mechanisms of action—binding polysaccharides to carbohydrate receptors on the cell surface of T-cell lymphocytes and macrophages, generating oxidative burst and selective cytokine production in macrophages, increasing the number of peripheral blood leukocytes, polymorphonuclear cells in particular, and enhancing phagocytosis (Blumenthal, 2003). Other immunomodulating herbs include *Arctium lappa* and the mushrooms *Lentinus edodes* (shiitake), *Ganoderma lucidum* (reishi), *Grifola frondosa* (maitake), and *Trametes versicolor* (turkey tail), all due to their mucopolysaccharide content. Lymphagogue herbs move lymph, supporting elimination of toxic accumulation, thus enhancing immunity. Key herbs that move the lymphatic system are *Calendula officinalis* (marigold), *Galium aparine* (cleavers), *Phytolacca Americana* (poke root), and *Fouquieria splendens* (ocotillo cactus).

## TONIC HERBS

There are also tonic herbs that can support the organs and functioning of the urinary tract. Although many of the herbs already mentioned in other action groups will be tonic to the urinary system, there are two that stand out in this action, i.e., *Centella asiatica* (gotu kola) and *Parietaria diffusa* (pellitory of the wall). *Centella asiatica* is a connective tissue tonic, strengthening the fascia and ligaments that support the organs of the urinary system. It is also a nervous system tonic, soothing the neurogenic aspects of any UTI. *Parietaria diffusa* is referred to as the trophorestorative of the kidneys and the entire urinary tract. The flavonoids act as inflammation modulators as well as connective tissue strengtheners. It can be used in acute treatment, but can be better suited in long-term use for chronic/recurrent UTI, irritation from gravel or stones, and for interstitial cystitis.

### DOSING FOR ACUTE URINARY TRACT INFECTIONS

It is my recommendation that both an herbal tincture (or encapsulated) formula and an herbal tea be utilized. The tincture, or capsules, if you prefer, will deliver adequate quantities of the herbs as well as their actions to the body. The tea will support the herbal action of the tincture or capsules and will increase the fluid intake simultaneously.

The tincture in the ratio of 1:5 would be dosed 1 tsp/5 ml (1 US teaspoon = 4.928 ml) every 2 hr for 2 days, then 4 times a day for 4 additional days. This is 1 g of combined herb in each dose. Capsules can be adjusted accordingly. If the tincture is of 1:2 ratio, that would allow for decreased amounts, i.e., 1/2 tsp. or 2–2.5 ml, but the frequency of the dose would remain the same, i.e., one dose every 2 hr for 2 days, then 4 times a day for 5 additional days.

The tea would be a decoction of any root or bark, and a long infusion of leaf and flower, for about 8 hr. The long infusion allows the extraction of minerals along with other active components from the herbs into the tea. The tea is prepared 4 tbsp per quart of water, dosing 1 cup 4 times a day for 1 week.

### CASE STUDY

The patient is a 34-year-old woman reporting burning during urination, a sense of urinary frequency, urgency, and an overall feeling of fullness or

swelling in her vulvar/urethral area. There is slight tenderness on palpation of the suprapubic region, and no reported fever. Onset was 3 days ago after having sexual intercourse with a new partner. Condoms were used. Patient reports ongoing UTI history three to four times every year in the past as well with onset of new sexual partners, at other times no change of partner and without any other identifying etiology.

Urinalysis dip taken at this visit showed an elevated white blood corpuscle (WBC) and presence of bacteria.

The patient is diagnosed with an acute UTI. Although there are recurrent episodes relatively frequently, the acute situation needs to be treated immediately. The acute tincture and tea formulas below were formulated to address the current UTI.

Once the acute condition gets resolved, it is beneficial to work on the recurrence of infection so as to contain it from becoming chronic. The chronic UTI tincture and tea formulas, listed later in the protocol, along with preventive measures, address the chronic state.

### ***ACUTE URINARY TRACT INFECTION HERBAL FORMULATIONS***

#### **Tincture:**

- 1:3 *Arctostaphylos uva ursi* (Bearberry), antimicrobial (arbutin) 30 ml
- 1:4 *Chimaphila umbellata* (Pipsissewa), antimicrobial (arbutin) 20 ml
- 1:5 *Agothosma betulina* (Buchu), antimicrobial (volatile oils) 10 ml
- 1:3 *Elymus repens* (couch grass), demulcent, antimicrobial, immunostim 30 ml
- 1:4 *Echinacea spp*, immunostimulant 20 ml
- 1:3 *Fouquieria splendens* (ocotillo cactus), lymphagogue, circulatory stim. 10 ml

The first three herbs are included for their varying antimicrobial activity, comprising at least 50% of the formula. The *Elymus* is acting as a demulcent, cooling, and soothing the mucous membranes, while contributing some antimicrobial and immunostimulating activity due to the mucopolysaccharides present. *Echinacea* and *Elymus* will get the innate immune more active. The *Fouquieria* is a pelvic circulatory stimulant, moving lymph flow through the pelvis as well as delivering the herbal formula to the target organ system.

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 Urinary tea
 

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<i>Chimaphila umbellata</i>	20 g
<i>Juniperis communis</i>	5 g
<i>Gaultheria procumbens</i>	10 g
<i>Equisetum arvense</i>	10 g
<i>Urtica dioica</i>	10 g
<i>Achillea millefolium</i>	10 g
<i>Mentha piperita</i>	5 g
<i>Zea mays</i>	15 g

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The dosing was determined because of the acute nature of the condition, and the ratios of the tinctures being between 1:3 and 1:5. The dose is 1 tsp. every 2 hr for 2 days during waking hours. Then, 1 tsp. 4 times a day for 1 week more.

The *Chimaphila*, *Juniperis*, *Gaultheria*, as well as *Achillea* bring antimicrobial activity. *Equisetum* and *Urtica* are diuretics as well as nutrient rich. *Achillea* is inflammation modulating. *Mentha piperita* is a cooling member of the mint family, helping to balance the bitter taste of *Achillea*. *Zea mays* acts as a demulcent, and osmotic diuretic.

Prepare 1 quart of tea daily. Put 4 tbsp in 4 cups of water, bring to a boil, turn off the heat, let it steep for 8 hr, drink 1 cup 4 times a day for 1 week. Note, these herbs are all being infused rather than decocted. If roots or barks of the herbal plants are used they would need to be first decocted and then leaves and flowers would be added after the fire is turned off, and infused.

In addition to the urinary tea, the patient is recommended to drink  $\frac{1}{4}$  cup of unsweetened cranberry juice 4 times a day. This can be taken through the acute phase. In the case of this patient with the chronic/recurrent aspect, cranberry juice can be used  $\frac{1}{4}$  cup 2 times a day preventively.

The return office call was 1 week later, and all symptoms of the UTI have resolved. She has no more burning and pain upon urination. All symptoms have resolved, and the urinary dip stick showed no elevated WBCs or bacteria present.

Although this patient has resolved the acute UTI, it is important to address the underlying causes of the chronic/recurrent nature of her situation. An evaluation of her diet is essential, supporting food choices that would alkalinize her system, making her less susceptible to the recurrence

of infection. Evaluation and support for her overall digestive function will enhance absorption and utilization of nutrients, as well as her immune function. Inclusion of probiotic supplementation, *Lactobacillus acidophilus* and *bifidus*, supports the balancing of the flora of the gut, which directly impacts both the reproductive and urinary systems. It will be important to assess and enhance her elimination function, including elimination through the primary organs of secretion including colon, kidneys, liver, lungs, and skin. Herbal support can be incorporated to work with the digestion, elimination, and immune functions, as well as specifically to tonify and increase function of the urinary system.

### **CHRONIC/RECURRENT URINARY TRACT INFECTION HERBAL FORMULATIONS**

A look at the acute formulas, both tincture and tea, will give evaluation as to whether any of the herbs used acutely will be beneficial for a chronic condition. It is postulated that arbutin converts to antimicrobial hydroquinone in the presence of bacteria. Therefore, the previous consideration for not using *Arctostaphylos uva ursi* and *Chimaphila umbellata* for long term is being reevaluated. Both herbs have some tonic qualities, which can be useful during repair and maintenance. *Agothosma* and *Achillea* act as a mild inflammation modulator and stimulating and tonifying diuretic, all of which could be useful in chronic conditions. The antimicrobial action is not necessary in the chronic formula. *Elymus* and *Zea*, as demulcents and soothing agents to the mucous membranes, as well as osmotic diuretics, would be very useful in the preventative and restorative phases. *Juniperus* and *Gaultheria* would not be used for long term due to the potential irritation of the volatile oils to the kidney mucous membrane. *Equisetum arvense* and *Urtica dioica* are both very much tonic acting. *Equisetum* brings high quantities of silica, a mineral that is useful in reestablishing foundational matrix. *Urtica* brings high quantities of calcium, magnesium, manganese, iron, and other minerals. *Echinacea* is better used in the acute phase, to stimulate the immune function. Using an herb like *Fouquieria* as a pelvic circulatory stimulant would be beneficial to move any stagnation behind the recurrence of UTIs. The *Mentha* could be used as an adjuvant in both acute and chronic formulas.

In addition to any herbs being chosen from the acute formulas, the tonic herbs would be incorporated into a long-term tincture or tea. The two primary tonic herbs for the urinary system are *Parietaria diffusa* (pellitory of the wall) and *Centella asiatica* (gotu kola). One herb that comes from



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Tincture

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<i>Parietaria diffusa</i>	45 ml
<i>Equisetum arvense</i>	15 ml
<i>Agothosma betulina</i>	10 ml
<i>Crataeva nurvala</i>	20 ml
<i>Calendula officinalis</i>	10 ml
<i>Plantago spp</i>	5 ml
<i>Elymus repens</i>	10 ml
<i>Glycyrrhiza glabra</i>	5 ml

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the Ayurvedic materia medica, *Crataeva nurvala* (the three-leaved caper), is specific for increasing the tone of smooth and skeletal muscle, used as a bladder tonic and inflammation modulator (Bone, 1996). Other herbs to consider in a support role are *Rubus idaeus* (raspberry leaves) for its high mineral content and, in this case, a support for the female reproductive organs, *Galium aparine* (cleavers) and *Calendula officinalis* (marigold) for their ability to move the lymphatic channels and act as immunomodulators, and *Plantago spp* (Plantain) for its mucilaginous healing properties and tonifying tannins.

For this patient, the following formulas were given:

*Dose:* 1 tsp 2 times a day in a small amount of water. Continue with this tincture for 3 months.

*Dose:* 2 tbsp. herbal combination in 2 cups of boiled water, fire turned off, cover, allow to infuse for 8 hr. Drink 1 cup 2 times a day. Continue with this tea for 3 months.

The *Parietaria* is the trophorestorative for the urinary system. *Equisetum*, *Urtica*, and *Rubus* are nutritive, high in minerals. These are extracted

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Tea

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<i>Urtica dioica</i>	40 g
<i>Rubus idaeus</i>	30 g
<i>Galium aparine</i>	20 g
<i>Centella asiatica</i>	30 g
<i>Zea mays</i>	20 g
<i>Rosa canina</i> (hips)	20 g

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in the tincture as well as the long infusion tea. *Agathosma* is chosen to be present in case of any microbial activity. *Crataeva* and *Centella* will tonify the mucous membranes, connective tissue, and smooth muscle, bringing strength and function. There are many demulcents including *Calendula*, *Plantago*, *Elymus*, *Glycyrrhiza*, and *Zea mays*, all supporting the diuretic action and soothing to the mucous membranes. *Calendula* and *Galium* will keep the lymphatic channels moving. *Calendula*, *Glycyrrhiza* and all the mucopolysaccharide demulcent herbs will bring immunomodulating action. The *Rosa* (hips) will bring bioflavonoids to strengthen the overall urinary system.

It has been 1 year since any episodes of UTI for this patient. She has been off the tinctures for 7 months, yet continues to drink the tea at 1–2 cups per day, as well as continues to have 1/4 cup of cranberry juice daily.

This case is just one example of how herbal medicine can be effective in resolving acute UTIs as well as addressing underlying patterns of chronic/recurrent UTIs. As elaborated in this writing, the actions of herbs, as well as the dosing, play an essential role in determining how to use the herbs to affect such results. As a naturopathic physician and herbalist, I want to stress the importance of formulating individually for each patient in order to be sure to successfully address their individual needs and responses to the herbs.

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