

# D-Mannose: Natural Treatment for Urinary Tract Infections

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Urinary tract infection (UTI) is a common and distressing disease that affects up to 50 percent of all women and girls (and a much smaller number of men and boys) over the course of a lifetime. Each year, UTIs are responsible for 10 million doctor visits.[1 - 4] Some people seem to be more susceptible than others; women who have suffered one UTI are very likely to experience a recurrence from time to time.

Some UTIs are merely painful (sometimes very painful) and annoying. However, other UTIs-especially if they're chronic, recurrent, or not treated promptly and properly-can be quite dangerous. Under these conditions, bacteria may ascend to the kidneys (Fig. 1), where infection can lead to serious damage and even kidney failure.

Conventional medical treatment of UTIs involves the use of antibiotics. While these drugs are usually - but not always - effective, curing most infections in a few days, they also have some important drawbacks:

- Antibiotics are equal-opportunity microbe killers. Although they usually make quick work of the UTI-causing bugs, they don't just stop there. They also kill millions of other "friendly" bacteria that belong in the body where they serve numerous important functions.
- Because they kill off friendly bacteria living in the gastrointestinal (GI) tract, antibiotics can cause unwanted side effects, such as diarrhea, constipation, nausea, and occasionally, vomiting. If enough friendly bacteria are killed, "not-so-friendly" yeasts, molds, and bacteria -all of which can produce unwanted toxins-are encouraged to take their places. Since friendly bacteria normally produce significant amounts of several vitamins-folic acid and vitamin K are the best-known examples-antibiotic use can contribute to long-term hidden vitamin deficiency.
- In addition, many women who take antibiotics (to treat UTI or any other infection) soon come to expect that they will develop a vaginal yeast infection requiring them to take yet another drug - this time an antifungal-to kill the yeast.

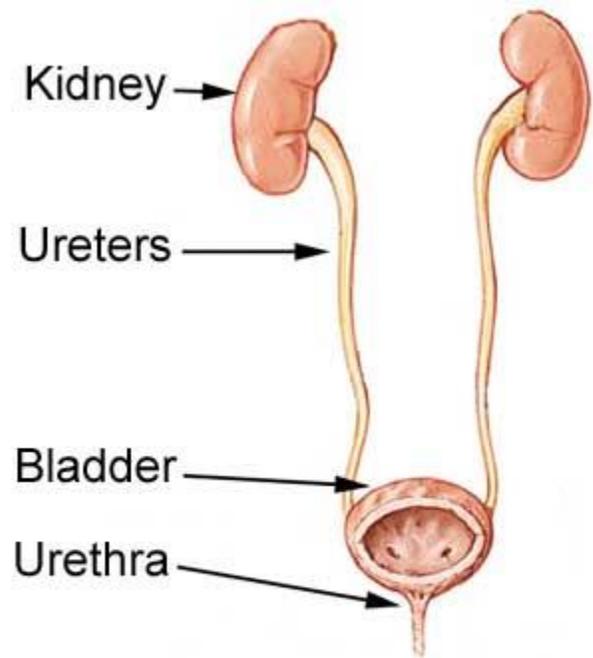


Fig. 1. Human urinary tract.

- The reason is that friendly bacteria that normally inhabit the vagina keep the yeast (usually *Candida albicans*) population under control. Once these friendly bacteria are taken out of the picture by the antibiotic, the yeast organisms are free to grow unchecked.
- Although most of them can tolerate antibiotics without immediate side effects, every year a few people are rushed to the hospital because of allergic reactions to these drugs.
- Lastly, the use of antibiotics promotes the development of bacterial species that are able to resist these drugs. Bacteria are very clever in their ability to mutate genes, making themselves "immune" to the effects of antibiotics. Those bacteria that have become immune then pass this ability on to their offspring or other bacteria. The likelihood that resistant bacteria will develop is enhanced by the misuse and overuse of antibiotics. The development of antibiotic-resistant bacteria is a major problem in medicine today that has many experts fearing the inevitable arrival of a "superbug" resistant to all known antibiotic drugs.

### **D-Mannose: The Natural Alternative to Antibiotics for Urinary Tract Infections**

D-mannose, a simple sugar and close cousin of glucose, can cure more than 90 percent of all UTIs within 1 to 2 days. Even more remarkably, D-mannose accomplishes this feat without killing a single bacterium! Exactly how this will be explained later. Suffice it to say that, because it gets rid of UTI-causing bacteria without committing "bactericide," people who use it suffer none of the unwanted side effects of antibiotics: no GI problems, no yeast infections, no resistant bacteria. In fact, D-mannose has no adverse side effects of any kind.

As a bonus, D-mannose actually tastes good. Where a "spoonful of sugar" helped the medicine go down in Mary Poppins's day, with D-mannose, a spoonful of sugar is the medicine.

Because it is so effective and so benign, women (even pregnant women) who are susceptible to recurrent UTIs can safely take D-mannose as a preventive measure to head off future attacks. D-mannose is also ideally suited for children with UTIs. Because it tastes so good (it is a sugar, after all!), children actually enjoy taking it.

Although D-mannose is virtually unknown to practitioners of conventional medicine, many research reports have demonstrated its mode of action and effectiveness against *E. coli*, the microorganism that causes most UTIs. Moreover, nearly 15 years of clinical experience have shown that it is just about as effective at curing UTIs as antibiotic drugs.

At first glance, D-mannose may sound too good to be true: a "medicine" that's highly effective, perfectly safe, pleasant to use, inexpensive, and available without a doctor's prescription. Yet, it is true! Unlike virtually any conventional medication; and many natural or "alternative" treatments as well, D-mannose has no known drawbacks.

### What Is UTI?

UTI is a bacterial infection (caused by the bacteria *E. coli* over 90 percent of the time) that affects the inside lining tissue of the urinary system (or tract). The urinary tract reacts to a bacterial infection in much the same way that the upper respiratory system reacts to a cold virus. The tissues become inflamed, irritated, and swollen. Just as it's hard to breathe through swollen and inflamed nasal passages, swollen and inflamed urinary ducts can partially obstruct normal flow, making it painful and difficult to pass urine.

Ordinarily, the urinary system is hostile territory for bacteria, viruses, or any other microorganisms. Bugs that do make their way into a healthy urinary tract are likely to find an inhospitable acidic environment (pH <5.5). They are also subject to attack by the body's immune defenses. (Adult men have the added protection of a specific bacterial growth inhibitor squirted directly into the urinary system by their prostate gland.) Even if microorganisms manage to overcome these considerable obstacles, they would typically be flushed out with the normal flow of urine. So effective are these natural antibacterial defenses that in a study in which bacteria were instilled directly into the bladders of guinea pigs, simple urination expelled 99.9 percent of the bugs.[5]

Despite all these built-in safeguards; each year millions of people, overwhelmingly women, still develop UTIs. Most UTIs begin when bacteria originating in the bowels travel to and grow in the urethra. Infections limited to the urethra are known as "urethritis." When bacteria travel upstream to the bladder, the infection is called "cystitis." Infections that reach the kidneys are known as "nephritis" or "pyelonephritis."

The *E. coli* that cause most UTIs are among the most common friendly bacteria in the GI tract, where they aid digestion, produce a few vitamins, and in general, behave themselves without bothering us (Fig. 2). However, when *E. coli* and other bugs exit the lower GI tract, they may gain entry to the urinary tract via the urethra, where they may attach to the internal lining of the bladder, multiply, and spread.

Although up to 90 percent of UTIs are caused by *E. coli*, the remaining 10 percent are caused by bacteria known as *Chlamydia*, *Mycoplasma*, *Neisseria gonorrhoeae*, and others. Unlike *E. coli*, these bugs tend to be transmitted via sexual contact and rarely cause the more serious bladder and kidney infections. *Chlamydia*, *Mycoplasma* and *N. gonorrhoeae* infections do not respond to D- mannose treatment and will probably require antibiotic treatment. In addition, a few UTIs are caused by other bacteria, such as *Proteus* or *Staphylococcus* ("Staph"). Still, all of these non-*E. coli* infections combined amount to no more than 10 percent of all UTIs.



Fig. 2. *Escherichia coli* adhering to human intestinal cells.

### **Treating UTI Naturally with D-Mannose**

When faced with a potentially pathogenic germ like E. coli, conventional, pharmaceutically based medicine typically confronts the problem by throwing the most potent poisons it can find at the bugs -antibiotics. While there's nothing essentially wrong with killing disease-causing bacteria, this approach does have some very serious drawbacks, as we have noted earlier. Happily, "bacteria-cide" is not the only possible avenue of attack.

Another, more natural way to eliminate E. coli infections from the urinary tract is to beat them at their own game. If they're going to cause trouble, bacteria usually have to find a way to adhere (stick) to the body tissue they're infecting. In UTI, E. coli attach to cells lining the bladder and urinary tract using filmy, hair-like projections called fimbria on their cell walls.[6]

At the tip of each fimbrium is a glycoprotein (a combination carbohydrate and protein) called a lectin that is programmed to bind to the first molecule of the sugar mannose that it encounters.[7]

It turns out that molecules of mannose (produced inside urinary tract lining cells) naturally dot the surfaces of these cells. Here they act as "receptors," inviting the fimbria of E. coli to attach, and allowing them to bind to the tissue in a tight, Velcro- like grip.[7] If not for this attachment to the cell's mannose, any E. coli that had successfully ventured up the urethral river would be unable to stick to the slippery surface and would be washed right back out on the next tide of urination.

What happens when we take D-mannose to treat a UTI? Now imagine what would happen to E. coli in the urinary tract if those sweet little mannose molecules they crave were present not just on the surface of the epithelial cells but surrounding them in the urine as well. The E. coli couldn't turn around without bumping into D-mannose "just floating around" in the urine. Unable to resist the tasty bait they suddenly find themselves swimming in, they would latch onto the nearest mannose molecules, and happily sail off into the porcelain sunset. Those few E. coli left clinging to mannose molecules on cells then become easy prey for white blood cells and other agents of the immune system.[8-10]

### **How Taking D-Mannose can Treat or Prevent UTI.**

In addition to its natural occurrence in the cells lining the epithelial tract, the sugar D-mannose is also found in relatively large quantities in fruit such as peaches, apples, oranges, and certain berries, like cranberries and blueberries. Extracted in the form of D-mannose, a white crystal sugar similar to glucose, it can be easily dissolved in a liquid and swallowed. (Mannose can also be synthesized from other simple sugars.)

When someone with UTI consumes a dose of D-mannose, the sugar is absorbed in the upper GI tract, but at a much slower rate than most other sugars. (For example, glucose is absorbed more than eight times faster.)

Moreover, unlike other sugars, D-mannose is not readily converted to glycogen (and stored) in the liver, but instead passes directly into the bloodstream largely unchanged." [7, 11, 12]

As the D-mannose-laden blood passes through the kidneys, a considerable proportion of the sugar is extracted and added to the urine. The D-mannose- sweetened urine flows from the kidneys through the ureters to the bladder and on to the urethra, literally sugar-coating any free-floating E. coli it might encounter, so they can't stick to cells any more. It also unsticks most of the E. coli already "Velcroed" to the inner surface of the bladder and urinary tract, ultimately flushing them all down the drain.

### **How Do We Know That D- Mannose Really Works?**

First, the "molecular mechanism" of the action of D-mannose on E. coli is scientifically proven. There's no argument at all about this among researchers who've studied it. Second, literally tens of thousands of women working with natural medicine doctors have successfully applied this science to their own UTIs.

Considerable circumstantial evidence, combined with common sense and over 15 years of clinical experience, makes a compelling case for the therapeutic value of D-mannose. In one laboratory study, for example, rats' urinary tracts were inoculated with E. coli. Within one day, those rats also given D- mannose were found to have significantly lower levels of bacteria in their urine.[13] In another study, administering a mannose-like substance (niethyl a-D-mannopyranoside) to E. coli-infected mice led to a 90 percent reduction in bacterial attachment to the urinary tract. Research in humans shows that ingesting D-mannose significantly elevates blood mannose levels, a prerequisite if urinary levels are to rise. [14]

Perhaps the best available evidence, though, comes from the experience of people who have used it. Natural medicine-oriented physicians have been recommending D-mannose to people with UTI since the mid-1980s with great success. For example, in one case, a 5-year- old girl had almost continuous UTIs for her entire life that had failed to respond to every antibiotic therapy her physicians tried (72 doctors in all!). At the end of their rope, her doctors were now considering a kidney transplant, since her kidneys were starting to fail due to years of chronic infection. Since urine culture showed her UTI was due to E. coli, she was started on D-mannose (1 tsp in a glass of water every 2-3 hours). Within 48 hours, her infection had vanished, and her kidneys were saved!

D-mannose can also be very effective in cases of "honeymoon cystitis." It's not uncommon for women to avoid sex because they get a bladder infection nearly "every time" they have intercourse. If a urine culture shows the presence of E. coli, taking D-mannose, 1 teaspoon 1 hour prior to intercourse-will mostly likely completely eliminate further infections.

Physicians experienced with D-mannose report that women prone to very frequent recurrent UTIs that are not necessarily related to sexual intercourse can also often benefit from taking D-mannose preventively. To save expense, some women have been able to "taper down" their dosage and dose frequency.

By far the most frequent success with D-mannose has been achieved by the thousands of women who have suffered single (nonrecurrent) episodes of bladder infection. In over 90 percent of such cases, 1 teaspoon of D-mannose every 2 to 3 hours usually clears the infection in 1 to 3 days.

### **Try D-Mannose First!**

Ninety percent of the time, UTI is caused by E coli and will respond to D- mannose treatment with significant symptom reduction within 24 hours. (Even though symptoms are improved within 24 hours, D-mannose should be continued for 2 to 3 days after the last symptom is gone, just to "make, sure.")

### **A Word of Caution**

If a UTI treated with D-mannose does not show significant improvement within 24 hours (about 10 percent of cases), it is likely that the causative organism is not E. coli, and a visit to the doctor for a conventional antibiotic may therefore be in order.

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