

## A Review - Herbs in Urinary Tract Infection (UTI)

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### ABSTRACT

Urinary Tract Infection (UTI) affects various part of the urinary tract. When it affects the lower part it is known as a bladder infection and when it affects the upper part it is known as kidney infection clinically, presence of more than 1 Lakh organisms per ml of midstream sample of urine (MSU) is an indication of urinary tract infection. A pain and burning feeling when you urinate, Urethral discharge containing pus or mucus, Frequent and urgent need to urinate especially at night, Obstructed urinary flow, Lower back pain, Unexplained fever, Cloudy urine with visible blood are the common symptoms of UTI. Cranberry, blue berry, berberine, bearberry, buchu oil etc are found to be effective in urinary tract infection. The fimbriae of E.coli produce two types of adhesins such as mannose sensitive and mannose resistant adhesins that attach to receptors on uroepithelial cells. Proanthocyanidin obtained from cranberry, blueberry etc shows extreme inhibitory activity against mannose-resistant adhesins. In bearberry the active antimicrobial activity is shown by aglycone hydroquinone which is released in alkaline urine. Buchu leaf is a diuretic and urinary tract antiseptic Urinary tract antiseptic activity is may be due to its essential oil. The essential oil consists mainly of the monoterpene diosphenol.

**Keywords:** Urinary Tract Infection, Proanthocyanidin, Adhesins

### INTRODUCTION

The urinary system includes that urinary bladder, kidneys, ureters (the tube that carries urine from the kidney to the bladder) and urethra. Urinary Tract Infection (UTI) affects various part of the urinary tract. When it affects the lower part it is known as a bladder infection & when it affects the upper part it is known as kidney infection. This occurs due to colonization and multiplication of organisms. Clinically, presence of more than 1 Lakh organisms per ml of midstream sample of urine (MSU) is an indication of urinary tract infection. The most common cause of infection is Escherichia coli, though other bacteria, virus, fungi or parasite. UTI is more common in female due to shorter urethra & lack of defensive bactericidal prostatic gland<sup>1</sup>.

Normally the Urinary tract prevents the growth and multiplication of organism by virtue of the following factors:

A high rate of urine flow

Mucosal defense activity.

Regular complete bladder emptying

UTI classified on the basis of spread of infection to various organs of urinary system:

Lower urinary tract infection

Urethritis (inflammation of urethra)

Cystitis (inflammation of bladder)

Upper urinary tract infection

Ureteritis (inflammation of ureter)

Pyelonephritis (inflammation of kidney)

The following are the risk factors that can caused UTI

Sexual intercourse

Diabetes

Poor personal hygiene

Problems emptying the bladder completely

Having a urinary catheter

Kidney stones

Some forms of contraception

Pregnancy

Menopause

Use of spermicidal and tampons

Heavy use of antibiotics

*Symptoms*

A pain and burning feeling when you urinate, Urethral discharge containing pus or mucus, Frequent and urgent need to urinate especially at night, Obstructed urinary flow, Lower back pain, Unexplained fever, Cloudy urine with visible blood

*Herbal Drugs*

*Cranberry*

Cranberry has long been a popular remedy for urinary tract infections. In Britain, cranberry may refer to the native species *Vaccinium oxycoccos*<sup>2</sup> while in North America, cranberry may refer to *Vaccinium macrocarpon*<sup>3</sup>. Cranberries contain 80% water and 10% carbohydrates<sup>4</sup>. Among other constituents are flavonoids, anthocyanins, catechin, triterpenoids, organic acids, and trace of ascorbic acid. The major organic acids are citric, malic, and quinic acids, with small amounts of benzoic and glucuronic acids<sup>5</sup>. Anthocyanin pigments obtained from cranberry pulp are used for coloring applications<sup>6</sup> It is now known that E. coli, the most common cause of UTI, have hair like fimbria that protrude from their surface. The fimbriae

produce two types of adhesins such as mannose sensitive and mannose resistant adhesins that attach to receptors on uroepithelial cells. Two compounds of cranberries; inhibit *E. coli* adhesins. One of which is fructose that inhibits the mannose-sensitive fimbrial adhesins; other is a high-molecular-weight compound that inhibits the mannose-resistant adhesins<sup>7,8</sup>. Fructose is present mainly in all fruits but unique polymeric compound, which was later named “proanthocyanidin” present in only *Vaccinium* berries (i.e., cranberries and blueberries). Proanthocyanidin shows extreme inhibitory activity against mannose-resistant adhesins produced by urine isolates *E. coli* but shows moderate antiadherent activity against fecal isolates *E. coli*<sup>9,10</sup>.

#### Blueberry

Blueberries contain of 14% carbohydrates, 0.7% protein, 0.3% fat and 84% water. They also contain essential mineral manganese, anthocyanins, polyphenols, vitamin C, vitamin K & dietary fiber<sup>11,12</sup>. The result indicates that blueberry extracts possess similar anti-adhesive effects against uropathogenic bacteria<sup>13</sup>. Fruit extracts such as guava, mango, orange, grapefruit or pineapple, blueberry are compared for inhibiting binding of bacteria i.e. *E. coli* to uroepithelial cells. Studies showed that the constituents in blueberry extracts i.e. high molecular weight proanthocyanidin inhibited bacteria from adhering to the uroepithelial cells using the mannose-resistant adhesions<sup>14, 15</sup>.

#### Berberine

Berberine is an alkaloid present in many plants; it is mainly present in the root, rhizome, and stem bark of the plants. Berberine show the inhibitory effect on the growth of several bacterial pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *E. coli*, and *Bacillus subtilis*<sup>16</sup>. It has also demonstrated that growth of clinical isolates of *E. coli* in the presence of berberine sulfate completely inhibited fimbria synthesis<sup>17</sup>. Thus, it is effective in UTIs by stopping the migration of the pathogen from the gut, a reduction of *E. coli* load in the gut<sup>18</sup>.

#### *Arctostaphylos uva ursi* (Bearberry)

In bearberry the active antimicrobial activity is shown by aglycone hydroquinone which is released in alkaline urine<sup>19</sup>. In clinical studies extracts of *uva ursi* or isolated arbutin was given to human subjects and their urine is examined against *E. coli*, *P. mirabilis*, *P. aeruginosa*, *S. aureus* etc. Study demonstrated that the crude extract of *uva ursi* was more effective against bacteria than arbutin by itself<sup>20,21</sup>. Supporting this, a study demonstrated that growth of clinical isolates of *E. coli* in the presence of *uva ursi* extracts increased the microbial cell surface hydrophobicity, thereby decreasing their ability to adhere to host cells<sup>22</sup>. Additionally; *uva ursi* has diuretic and anti-inflammatory effects that indirectly aid in its use as an antimicrobial to control UTIs<sup>23,24</sup>.

#### Buchu Oil, *Barosma betulina* (*Agathosma betulina*)

It is principally use is in the treatment of chronic diseases of genitourinary tract i.e. Chronic inflammation of the mucous membranes of the bladder, irritable conditions of the urethra, abnormally acidic urine with a constant desire to urinate<sup>25</sup>. Buchu leaf is a **diuretic and urinary tract**

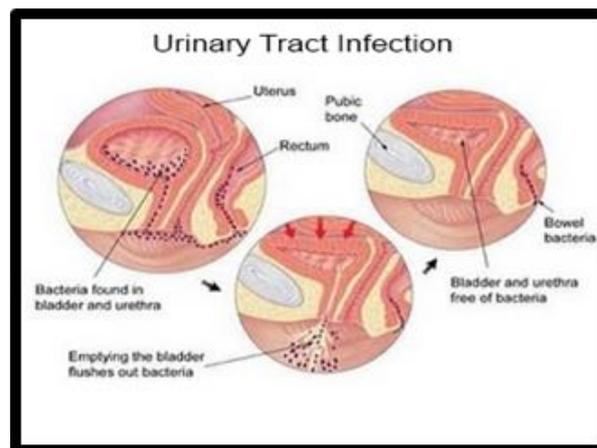


Figure 1

antiseptic. Urinary tract antiseptic activity is may be due to its essential oil<sup>26</sup>. The essential oil consists mainly of the monoterpene diosphenol. An in vitro study demonstrated some activity for the alcoholic extract of buchu against microflora typical of urinary tract infections. The essential oil (5 mg/plate) showed considerable activity against all the test organisms<sup>27</sup>.

#### CONCLUSION

Natural products have played a very important role in health care and prevention of diseases form thousands of years. From centuries; people used herbal medicines for safety, efficacy, cultural acceptability and lesser side effects. Plant and plant products have utilized with varying success to cure and prevent diseases throughout history. Cranberry, blue berry, berberine, bearberry, buchu oil etc are found to be effective in urinary tract infection.

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