REVIEW ON URINARY TRACT INFECTION RELATED TO HERBAL PRODUCTS

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Abstract

The infection in any part of the urinary system which involve kidney, ureters, urethra and bladder this is called as a Urinary Tract Infection (UTI). This is one of an ultimate serious difficulties influencing both genders in that the females are more permitting because of the dissimilarities in urogenital and reproductive anatomy and physiology. The second most common type of infection in the body is urinary tract infection. About 80% of urinary tract infections in adults can cause by Escherichia coli. In this review described the used of herbal medicines in treatment of urinary tract infections compared to chemical drug this herb shows the safety and effectiveness and reduced the side effects that may cause if administration of antibiotics. The microbial infections involving Escherichia coli, Klebsiella species and Enterococcus faecalis are the crucial cause of urinary tract infection with a several signs and symptoms involving frequent urination, painful urination or dysuria, urinary urgency, burning micturition, haematuria, nausea, and vomiting. The first choice of drugs is used i.e., antibiotics such as Sulfamethoxazole, quinolone and trimethoprim. Although, because of the microbial resistance, various life-threatening adverse effects, frequent elevated doses, more cost and less effectiveness of these antibiotics prompt the researchers to investigate natural medicines for urinary tract infection treatment. The herbal treatment of urinary tract infection herbs is effectual to conflict bacterial resistance with high effectiveness and simply availability with minimum or no adverse effects therefore, to achieve the attention to investigated.

Keywords: Herbal medicines, Urinary tract infection, Escherichia coli, Medicinal plants,
Introduction

The infection in any part of the urinary system which involve kidney, ureters, urethra and bladder this is called as a Urinary Tract Infection (UTI). When it influences the lower urinary tract, it is called as a cystitis \[^1\] because of the person might feel like need to pee a lot and hurt when peeing. Also seen the lower belly pain and bloody urine. When it influences the upper urinary tract, it is called as a pyelonephritis and this cause fever, chills, nausea and pain in upper back or side. When peeing, it can cause a discharge and burning is urethritis, occurs when it affects urethra this is another type of Urinary Tract Infection \[^2\]. The second most common type of infection in the body is urinary tract infection. About 80% of urinary tract infections in adults can cause by Escherichia coli. The Staphylococcus saprophyticus, Chlamydia tracomatis and Mycoplasma hominis this are the other bacteria that cause urinary tract infections. Without travelling into the bladder if the infection stays in urethra, it is known as urethritis and are generally limited to burning while urinating. The cystitis means an inflammation of the bladder which is usually the outcome of a bacterial infection. The term cytourethritis is occasionally used when both the urethra and bladder are included. The severe and life-threatening infections can cause if untreated bladder infections can occasionally travel up into the kidney this is called as a pyelonephritis. The term uretitis means the infection in the ureter. The cystitis or simply a bladder infection can cause when bacteria enter the urethra then enter into the bladder. Predominantly, the infection stays in bladder yet it can move on up into the kidneys generating a more serious infection. The primary bladder infection generally comes on immediately and with insistence. The symptoms can be painful, rapidly growing and overwhelming in their intensity. These urinary tract infections normally start from symptoms of urinary frequency, burning on urination and voiding only a less volume of urine and may be blood in the urine \[^3-6]\.

For demonstrating a healthy body environment medicinal plant have become a growing substitute. This play a vital role for the treatment of various types of diseases and disorders being ancient time involving urinary tract infections \[^7\]. This shows the effects on urinary tract infection as a disinfectants, diuretics, analgesics and narcotics also. The few of them shown to have an antimicrobial effect against Escherichia coli and other organisms that produce urinary tract infections. For determining the urinary tract infections, the medicinal plants can show the effectiveness in programs \[^8\]. To avert and treat infectious diseases plant medicines are used on a worldwide scale. For the primary health care due to their extensive biological and medicinal activities, excessive safety margin and lower costs, plant medicines are in an
appreciable demand both in the developed and developing countries [9]. The what percentage of people are now using different treatments it is unidentified but definitely large quantity of women are drinking cranberry juice or using herbal remedies to improve their immune status or taking probiotics to recover the normal vaginal flora, which generally gets disturbed after an antibiotic treatment. The vaccine occurrence for organisms other than E. coli still an endure unclear [10]. The precise mechanism of herbal remedies used to treat the urinary tract infections is still not well evident however because of the lack of research, it was described that phytochemical components represented as nutraceuticals and immunomodulators, boost body oxidant status or give the antioxidant elements, avoid devotion of microbes and stop the expansion or accumulation of microorganisms and few might act as microcidal. These divergent things of medicinal plants are because of the existence of a several phytochemical components involving Alkaloids, Flavonoids, Glycosides, Phenols, Anthraquinones, Saponins, Tannins, Terpenoids, Triterpenoids, Phenols, Phytosterols, Steroids, Sterols, Hydrocarbons, Mono and Sesquiterpenes, phlobatannins and several additional medicinal plant secondary metabolites. Flowers, leaves, bark, fruit, seeds and even entire fragments of medicinal plants were consumed to treat urinary tract infection and these fragments or their extracts are ingested orally and sometime it may be mixed with several other foods or drinks such as water, honey, milk, juices and black pepper etc. The quantity of herbal preparations is also dependable in some factors like sex, age and current health status of patient.

**Classes of Urinary Tract Infections**

There are mainly the two types of Urinary Tract Infections that is either complicated or uncomplicated. The complicated infection is very serious than uncomplicated infections because complicated infection occur in people with primary conditions or malformation in any part of the genitourinary tract, producing the infection more serious and more demanding to treat. However, uncomplicated urinary tract infection is divided into an infection happening in the absence of comorbidities or another anatomical urinary tract and renal deformities [11]. The prevalence of complicated urinary tract infections is considerably less than that of uncomplicated urinary tract infections, which arise in apart from that healthy people with normal genitourinary tract anatomy [12]. Although, the uncomplicated infections are usually simple to manage and therapy with a less course of antibiotics is normally effectual. Because of the less possibilities of symptomatology urinary tract infections in children and males are usually classified as uncomplicated infections [13]. Particularly, the complicated urinary tract infection causative pathogens are linked to enhanced rates of antimicrobial resistance.
Accordingly, the development of effectual treatment to treat these conditions is crucial, not only to reduced the outcome of these infections but also to deliberate the evolution of additional antibiotic-resistant bacterial strains.

**Indications of Urinary Tract Infections**

Urinary tract infections may exist in various scheme involving enhanced and relentless necessity to urinate, irritating burning sensations correlated with urination, enhanced prevalence of urination, beneath volumes for individual urinary event and cloudy and foul-smelling urine. Pain in the beneath abdomen, back and pelvic area is also a moderately usual symptom of urinary tract infections, exceptionally in women \(^{[12]}\). Sometimes, urinary tract infections may affect in blood in the urine, which may include as red, pink or cola-coloured urine. Infection in the kidney may include with symptoms like nausea and vomiting, fever and upper back pain \(^{[13]}\). Several of these signs and symptoms are generic, and urinary tract infections are commonly disregard or misdiagnosed as another circumstances, extremely in older people.

**Herbal products used in the treatment of UTIs**

The term phytoproducts itself indicate that the products that are derived from the plants. Due to the fact that the plant and plant products are simply accessible and have a very tiny or no risk they can be the more effectual and a simple substitute in treating and preventing urinary tract infections. There are several phytoproducts that have been appealing choice for treating and preventing urinary tract infections. Few herbs are used to treat the UTIs this are discussed as follow:

**Ginseng:** The herb like Ginseng that accommodate anti-microbial activity. It also shows the anti-cancerous, anti-inflammatory, and has immunomodulatory effects. It is effectual against various urinary tract infections producing bacteria and is exactly effectual against pseudomonas aeruginosa which is one of the usual causative agents of urinary tract infections. Ginseng accommodate numerous elements that differ as specified by the year of cultivation and the refining technique used, like heating, drying and steaming which prompt several degrees of pharmacological activities \(^{[14]}\).
Coriander Seed: The bacteria breeding can stop by using three tablespoons coriander boiled in water and this drink as a tea once per days. This is a cooling herb which assist to decrease the painful urination [15].

Garlic: Garlic shows an antiviral, antibacterial and antifungal properties. This is because of the element diallyl-thiosulphate or allicin and sulphur accommodating compounds. Interstitial cystitis is a chronic situation that originate bladder pain. Garlic shows an antioxidant, anti-inflammatory and immune modulatory results that assist in the therapy of this situation. Over the collision of garlic on urinary tract infections not several studies have been done however one study manifest that in an experimental build-up of urinary tract infection model, garlic shows a remarkable influence in the debilitation of the virulence of Pseudomonas aeruginosa. For non-E. coli urinary tract infection garlic is used [16].

Clove: The clove oil is used to preserve against yeast infection and it is also used for urinary tract infections. It shows an anti-inflammatory property and works rapidly. It is also used to enhanced the immunity [17].

Berry Products: Cranberries are a class of evergreen shrimp shrubs and they are the component of healthy family and are associated to blueberries, bilberries and lingberries. Cranberries in a form of juice or tablets are broadly used and even occasionally it is lumping as an entire which assist in avoidance of urinary tract infection. The mechanism of action of cranberry involve impediment of bacterial (mostly E. coli) adhesion to uroepithelial cells [18]. The bacteria are not accomplished to occupy the mucosal surface of the urinary tract, thus it assists in avert urinary tract infection, when the adhesion is blocked. Singh et al. concluded that in this study in a group of patients, after 12 weeks of acquire cranberry extracts, when differentiate to placebo, bacterial adhesion reduced. The symptoms like dysuria, bacteriuria and pyuria, cranberry extracts were good to placebo in terms of urine pH depletion and prevention of urinary tract infections [19].

In another study Maki et al. evaluate the outcome of cranberry juice utilization on the experience of urinary tract infection events in women with a current history of urinary tract infection. They done the worked for 24 weeks, in that 185 women accepted 240 ml of cranberry juice in additional 185 women was taken a placebo potation. The results of that study indicated that 1 in 3.2 occurrence, clinical urinary tract infection was stop between cranberry intercession [20].
In another study, Takahashi et al. conducted a randomized, double-blinded study and exhibit that cranberry potation is higher to placebo in terms of urinary tract infection avoidance, however this was only notice in a group of female patients over 50 years of age. The conclusion is that the effectiveness of cranberry by products quiet endure arguable due to the fact that it decreases the possibility of only definite class of urinary tract infection and that to only in a restricted people [21]. However, cranberry juice did not crucially decrease the urinary tract infection possibilities differentiate with placebo in a study controlled by Stapleton et al. in which 176 premenopausal women with a current history of urinary tract infection were unsystematic (120 to cranberry juice and 56 to placebo) and observe up for an average of 168 days, even though a trend of defensive result was noticed in this study [22]. An inclusive outcome proposed that cranberry by products may be a choice for avoidance of urinary tract infection in healthy, non-pregnant patients, as well as in patients after gynaecological surgery when a catheter was placed.

**Corn silk (Zea mays):** Corn silk is a soothing, anti-inflammatory diuretic that decrease painful indication and swelling because of inflammation. It is used as an urinary demulcent. It is particularly convenient with extremely alkaline urine and for bladder impatience in children [23].

**Marshmallow root (Althaea officinalis):** Impede bacterial growth in the urinary tract and reinforce and wash bladder. It shows a properties like demulcent, emollient and a diuretic. It soothes urinary system and assist to medicate kidney and bladder inflammations. It is more beneficial to stop the bleeding in urine [24].

**Juniper berry:** Juniper berry consist of bitter composite that enhance the flow of urine. It improved the fabrication of digestive fluids that help in absorption and alleviate pain. This berry shows the properties like antiseptic, diuretic, and stimulant. It is immensely applicable with chronic cystitis however the greatest when not used when there is acute inflammation due to its effects in impatience of bladder. It consists of aromatic substances that enhance the flow of urine. Basically, these plants are taken as tea [25].

**Couch grass:** It shows the strongly diuretic properties with a soothing, anti-inflammatory healing effect on the lining of the bladder. It is convenient when there is mucus release from the bladder with irritating and recurrent urination [26].

**Cinnamom verum J. Presl. (Cinnamon):** Cinnamon can work against Staphylococcus aureus and E. coli. It shows an anti-tumour agent, anti-oxidant, anti-inflammatory, anti-microbial and
anti-diabetic effects. During urination it decrease the inflammation causing pain. Trans-cinnamaldehyde (0%, 1%, 1.25%, or 1.5%) was described to stop UPEC biofilm production both on plate culture and congenital catheters. It immobilized UPEC biofilm formation on catheters when trans cinnamaldehyde was used in catheter lock solution. Due to the fact that the test concentrations had no cytotoxic results on human bladder epithelial cells, it can be used as a surface coating for catheters or in catheter lock solution to avoid urinary tract infections [27]. Trans-cinnamaldehyde remarkably decreased uroepithelial cell extension and appropriation by UPEC by inhibiting the declaration of crucial genes correlated with its devotion and occupation to host tissue [28]. These detections assist the use of cinnamon as a natural treatment for urinary tract infections.

**Arctostaphylos uva-ursi (L.) Spreng (bearberry):** Arctostaphylos uva-ursi is also called as bearberry or upland cranberry, is a helpful herb for bladder infection. Bearberry leaves and production assembled from them have considerable antibacterial action (particularly against E. coli) and astringent action because of its arbutin appendix and diuretic effects. In a double-blind study of 57 women, five of twenty-seven women had a relapse in the placebo class while none of thirty women had a relapse in the uva ursi class after 1 year [29]. The authors Schindler et al. described that the total quantity of urinary excretion of arbutin metabolites (hydroquinone) endure similar in all the three groups, after the administration of a single oral dose of bearberry leaves extract or film-coated tablets or an aqueous solution in a randomized crossover study (n = 16) [30].

**Tribulus terrestris:** The family of this Tribulus terrestris is Zygophyllaceae and the familiar name is Kharkhask, Gokharu. It shows the anthelmintic, antibacterial, diuretic, anticancer, and aphrodisiac properties. It consists of vital components for therapeutic values like gitogenin, chlorgenin, tribuloside, kaempferol, rhamnose, saponins, stigmasterol, β sitosterol, neo-tigogenin, hecogenin, tribulosin, neohecogeninglucoside and cinnamamide [31].

**Phyllanthus amarus:** The Phyllanthus amarus belongs to family Phyllanthaceae. The familiar name is Jangli Amli. It shows hypoglycemic, hypotensive, diuretic and antibacterial properties. It consists of tannins, flavonoids, triterpenoids, lignins, gallic acid, geraniin, corilagin, niranthin and Phyllanthus [32].
Probiotics: The probiotics like Lactobacillus is well described for the avoidance of urinary tract infections and it may be taken vaginally or orally. Lactobacilli generate a critical circumstance as long as the urinary microorganisms cannot endure in urine. In the management of urinary tract infection, scientists are now aiming on the character of probiotics and manifest that it is advantageous against various microorganisms. It is noticed that probiotics indicate a defensive part in the urinary tract infection. The authors Reid at el., in year 2009 described that the Lactobacilli probiotic avoid the urinary tract infection by reinforce the immune system and reducing the arise number of microorganisms from the rectum, however, it may depend on colonization and survival of pathogens. Lactobacillus plantarum and Lactobacillus rhamnosus manifested the anti- adherence action of E. coli to gastrointestinal tract in- vitro. This may be because of an increase in the production of mucin, which has a defensive activity on the epithelial cells and it impede the adhesion of microorganisms. Another study manifests that oral Lactobacillus rhamnosus and a Lactobacillus reuteri could retrieve the vaginal lactobacillus 96% contrast to 53% in controls [33-37].

Ocimum sanctum: Ocimum sanctum be a component of family Lamiaceae. The familiar name is Tulsi. It shows an antibacterial, antipyretic, anti-inflammatory, analgesic and antipyretic activity. It consists of flavonoids, polyphenol, flavonols, flavones, carnosic acid, beta sitosterol, luteolin, myretenal, apigenin, rosmarinic acid, eugenol, vicenin. It is also used to treat the urinary tract infection [38].

Zingiber officinale: The family of the Zingiber officinale is a Zingiberaceae. The general name is Adrak and it is also called as Sondh. It shows an antibacterial, digestive and anti-inflammatory activity. It consists of zingiberine, zingiberol, α-zingibirene, shagaols, gingerols and dihydroparadols [39].

Table 1: List of regularly used medicinal herbs for urinary tract infections

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Common name</th>
<th>Botanical name</th>
<th>Plant part used</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Babool</td>
<td>Acacia nilotica Delile</td>
<td>Bark, Leaves, Gum</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Anarus</td>
<td>Ananus comosus (L.) Merr.</td>
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</tr>
<tr>
<td>3</td>
<td>Aparajita</td>
<td>Clitoria ternatea L.</td>
<td>Root</td>
<td>42</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Scientific Name</td>
<td>Part Used</td>
<td>Reference(s)</td>
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<td>-----</td>
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<td>----------------------------------------</td>
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</tr>
<tr>
<td>4</td>
<td>Mithazira</td>
<td>Pimpinella anisum L.</td>
<td>Seed</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>Green tea</td>
<td>Camellia sinensis L.</td>
<td>Leaves</td>
<td>44</td>
</tr>
<tr>
<td>6</td>
<td>Neem</td>
<td>Azadirachta indica A. Juss</td>
<td>Fruit, Bark, Leaves</td>
<td>45,46</td>
</tr>
<tr>
<td>7</td>
<td>Self-heal</td>
<td>Prunella Vulgaris</td>
<td>Stems, Leaves</td>
<td>47</td>
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<td>8</td>
<td>Chicori</td>
<td>Cichorium intybus L.</td>
<td>Leaves</td>
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<tr>
<td>9</td>
<td>Sorsa</td>
<td>Brassica nigra L. Left</td>
<td>Seed</td>
<td>49</td>
</tr>
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<td>10</td>
<td>Kalmegh</td>
<td>Andrographis paniculata Wall. Ex. Nees.</td>
<td>Leaves</td>
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<tr>
<td>11</td>
<td>Apium</td>
<td>Apium graveolens L.</td>
<td>Aerial part</td>
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<tr>
<td>12</td>
<td>Jamun</td>
<td>Syzygium cumini (L.) Skeels</td>
<td>Bark</td>
<td>52</td>
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<tr>
<td>13</td>
<td>Bhendi</td>
<td>Abelmoschus esculentus (L.) Moench</td>
<td>Fruit</td>
<td>53,54</td>
</tr>
<tr>
<td>14</td>
<td>Paatri</td>
<td>Abutilon indicum L.</td>
<td>Leaves, Roots</td>
<td>55</td>
</tr>
<tr>
<td>15</td>
<td>Chamomile</td>
<td>Matricaria recutita</td>
<td>Flower</td>
<td>56</td>
</tr>
</tbody>
</table>

**Probable adverse effects and awareness**

Few of the particular medicinal plants used in the treatment of urinary tract infections have been explore by systematic manner later on further are advise as maintained by extended histories of safety and effectiveness. Infrequently a herb at an advised dose causes digestive upset or headache or additional difficulties. This may deliberate the clarity of the preparation or added ingredients like synthetic binders or fillers. Because of this, only elevated quality, standardized extract formulas are proposed. Abuse or unsuitable use of these herbs may cause...
various difficulties. Few of this Eg. like Because of an elevated tannin content of uva ursi, few people may occurrence cramping, nausea and vomiting [57], contamination of plantain with digitalis prompt desperate adverse outcomes has been observed [58], immoderate application of juniper may cause kidney petulant [59], natural blueberries administered to be laxative and should be prevented in case of diarrhoea [60] etc.

Conclusion

In female urinary tract infection is one across the usual diseases in developed and developing countries with an elevated occurrence rate. The certain drugs and number of antibiotics are used to treat this infection but they cause some side effects and also antibiotics drug defiance has become a resulting challenge for clinicians to control the urinary tract infection related uropathogens. Instead of that, few herbal preparations manifest to be the best choice and examine that the supernatural blessings for urinary tract infection treatment. Additionally, the prime dose level and administration method is not clear. Apart from that the most of studies have been accomplished in laboratory culture media however only some experiments have been built to estimate their convenience on human subjects. Not any information is available about the interaction or subscription of herbal mixtures. Although, previously involving urologic herbs and their derivatives for treatment of urinary tract infection, few additional characterizations are to be made. After substantial examination of their bioactivity, mechanism of action, pharmacotherapeutics, toxicity and after genuine standardization and clinical trials, modern drugs from urologic herbs can be grow. As the universal framework is currently interchange about the use of non-toxic plant material having herbal remedies use, maturation of modern drugs from urologic herbs should be important for the control of urinary tract infections.

Conflicts of Interest

The authors declare no conflicts of interest.

Acknowledgement
References


