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AYURVEDIC AND HERBAL REMEDIES FOR URINARY TRACT INFECTIONS: RECENT PROGRESS AND CHALLENGES

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ABSTRACT

Urinary tract infection is a common condition that arises when there is an infection in the kidneys, ureters, bladder or urethra. The infection usually starts at the urethra and then goes up to the bladder and other parts of urinary tract like vagina in women. Mostly treatment of UTI's includes, however, major disadvantages are cost of treatment and side effect which, includes nausea, diarrhea, light headedness, headache, dizziness and insomnia. The Ayurvedic and herbal treatments for urinary tract infection could be the alternative, which will help to control the bacteria, act as immunomodulator, helps to maintain the pH of the urine and also helps the renal system to excrete more toxins from the body and use as an adjuvant with allopathic medicines. There are many herbal plants mentioned in Ayurvedic texts that are used for urinary tract infection and classified as, Urinary antiseptic and anti-adhesion herbs, Bladder protective, Kidney care herbs. In the present review we have discussed recent progress and clinical studies based on herbs to assess their effectiveness in the treatment of urinary tract infections.

KEYWORDS: Urinary tract infection, Antibiotic, Cystitis, Ayurveda, Herbal remedies.

INTRODUCTION

Urinary tract infections (UTIs) are a bacterial infection, affecting more than 150 million people each year worldwide.[1] UTIs are classified based on their location in the urinary tract and the presence or absence of associated symptoms. UTIs Clinically classified as complicated and uncomplicated and are differentiated into cystitis (lower UTI) and pyelonephritis (upper UTI).[2] UTIs are caused by both Gram-positive bacteria, Gram negative and fungi. For both uncomplicated and complicated UTIs the causative agent is Escherichia coli.[3] Healthcare-associated UTIs (HAUTIs) are the most common form of healthcare-acquired infection and the pathogens responsible vary according to region.[4]

Risk factors for development of UTIs in women includes, sexual intercourse, use of diaphragm (contraceptive) and spermicide, use of Antibiotic, and History of recurrent UTIs. The infection begins at the opening of the urethra where the urine leaves the body and flow upward into the urinary tract. Abnormalities of the urinary tract that hamper the urine flow are responsible of onset of infection. The recurrence of UTIs has personal and societal aspects which includes clinical and economic burden of the illness along with the social and psychological effects which will have negative effect on quality of life.[5] The virulent specie of Escherichia coli is found responsible for more than 90 percentages of cases of urinary tract infection.[1]

In UTI pathogenesis adherence is a main initiating each step. A UTI initiates with periurethral contamination by a uropathogens followed by colonization of the urethra and then migration of the pathogen to the bladder. In the bladder, the consequences of complex host–pathogen interactions ultimately determine colonization.

Treatments

Patients suffering from all form of symptomatic UTIs are commonly treated with antibiotics, but these treatments results in alteration of the normal micro biota of the vagina and gastrointestinal tract and in the development of multidrug-resistant microorganisms.[6] Surgical procedures are usually required for obstructive uropathy, anatomic abnormalities, and neuropathic urinary tract lesions. UTIs are becoming increasingly difficult to treat owing to the widespread emergence of an array of antibiotic resistance mechanisms.[7] The **figure 1, 2 and 3** depicts the treatment of UTIs and Prophylactic therapy and Acute Prostatitis in urinary tract infection and Treatment for Pyelonephritis and Epididymo-orchitiin urinary tract infection respectively.[8-10]

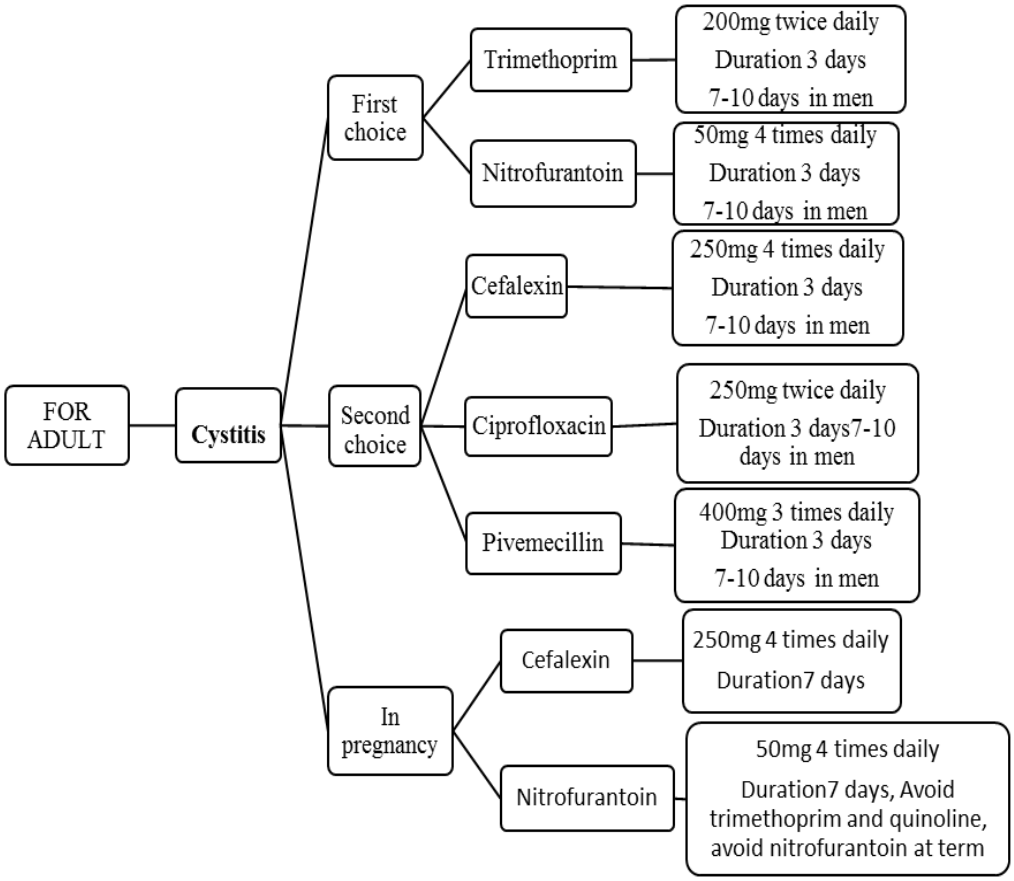

Figure 1: Treatment for cystitis in urinary tract infection.

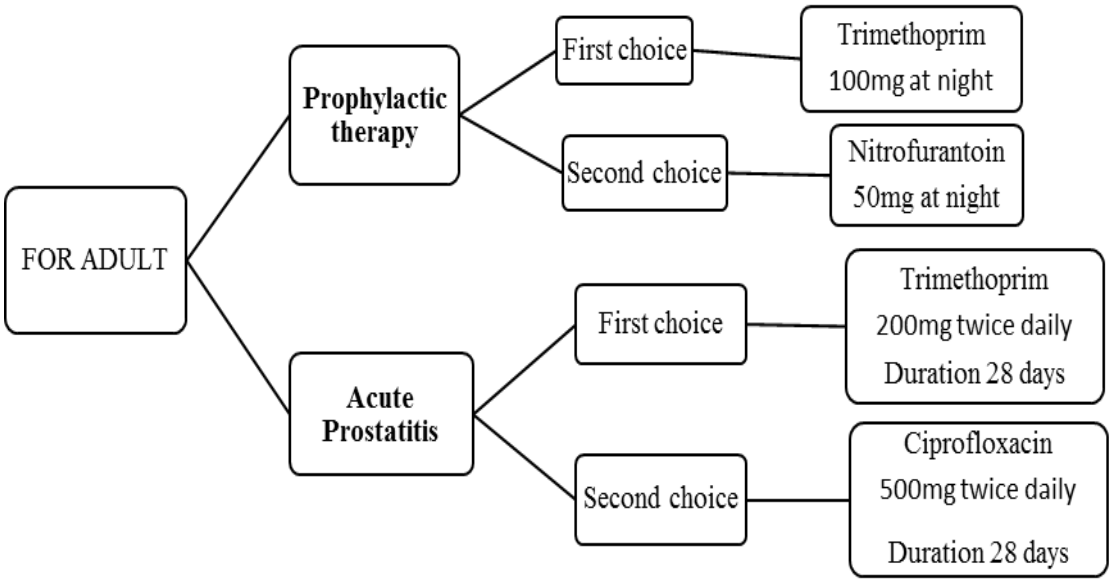

Figure 2: Prophylactic Therapy and Acute Prostatitis in urinary tract infection.

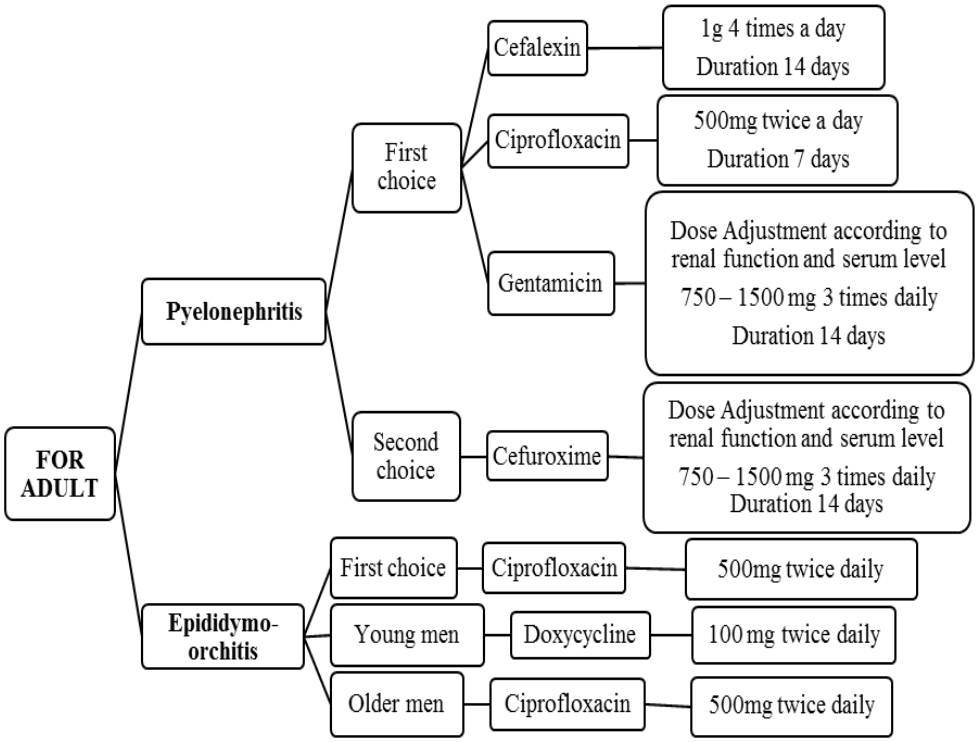

Figure 3: Treatment for Pyelonephritis and Epididymo-orchitin urinary tract infection.

Ayurvedic remedies for UTI's

Mostly, antibiotics are being used in UTIs, but are associated side effects and toxicity. Ayurveda science has mentioned several herbs and treatments for the UTIs. There are many herbal plants that are used for urinary tract infection can categorized as, Urinary antiseptic and anti-adhesion herbs, Bladder protectives, Kidney care herbs.[11] Combination of this herbs are used to make a preparation that will help to relive the urinary tract infection. The ayurvedic treatment mostly includes the drugs that helps renal to excrete more toxins from the body, drugs to maintain pH of the urine, drugs that act as immunomodulator, some drugs with antibacterial action and drugs that are cold in potency. The **table 1** summarized various herbs that are used in the treatment of urinary tract infection.[12-26]

Table 1: Herbs used in treatment of urinary tract infection.

Botanical name	Family	Active phytochemicals
Prunella Vulgaris	Lamiaceae	Phyto steroids, Tannins, Lupeol, Sitosterol
Camellia sinensis L.	Theaceae	Phenolic compounds, Glycosides, Alkaloids
Malva sylvestris L	Malvaceae	Alkaloids, Tannins, Phenols, Flavonoids, Saponins,
Hibiscus rosa-sinensis	Malvaceae	Flavonoids, Steroids, Tannins, Glycosides,

(Flower)		Terpenoids,
Cucumis sativus L.	Cucurbitaceae,	Cardiac glycosides, Tannins, Phytosterol, Terpenoids, Saponins,
Clitoria ternatea L.	Fabaceae	Phenols, Flavonoids, Saponins
Ananus comosus (L.) Merr.	Bromeliaceae,	Alkaloids, Phenols, Flavonoids, Glycosides, Tannin, Phytosterols
Cichorium intybus L.	Asteraceae	Flavonoids, Terpenoids, Tannins, Saponins, Cardiac glycosides
Caesalpinia nuga (L.) Aiton	Fabaceae	Flavonoids, Carbohydrates, Glycosides, Phenols, Saponins, Tannins
Brassica nigra L. Left (Seed)	Brassicaceae	Flavonoids, alkaloids, Sterols, Saponins, Glycosides, Steroids, Tannins,
Bidens pilosa L.	Asteraceae	Alkaloids, Flavonoids, Steroids, Anthraquinones, Tannins, Glycosides, Saponins,
Azadirachta indica A. Juss.,	Meliaceae,	Alkaloids, Polyphenols, Saponins, Flavonoid, Anthraquinones, Cardiac glycosides, Terpenoids, Terpenes, Steroids, Tannins,
Andrographis paniculata Wall. ex. Nees.	Acanthaceae	Alkaloids, Anthracene, Steroids, Glycosides, Quinines, Flavonoids, Phenols, Tannins
Pimpinella anisum L.	Apiaceae	Alkaloids, Flavonoids, Cardiac Glycosides, Terpenoids, Carbohydrate, Phytosterols
Vigna mungo L.	Fabaceae	Flavonoids, Alkaloids, Phenols, Ascorbic acid, Steroids, Tannins Glycosides, Saponins
Abutilon indicum L.	Malvaceae	Alkaloids, Steroids, Flavonoids, Sterols, Terpenoids, Phenols, Glycosides, Saponins
Zizyphus jujuba Mill.	Rhamnaceae	Alkaloids, Glycosides, Flavonoids, Saponins, Phenolic, Terpenoids
Prunella Vulgaris	Lamiaceae	Phytosteroids, Tannins, Lupeol, D- camphor and Fenchone, Cyanidin, Delphinidin, Beta-sitosterol

Research envisaged on anti-fungal activity of her

It has been reported that, diuretics like *Solidago* spp herb, *Levisticum officinale* root, *Petroselinum crispus* fruit, and *Urtica dioica* increase urine volume in people with urinary disorder. People, who consume antiseptic and anti-adhesive herbs like *Arctostaphylos uva-ursi* (uva ursi), *Juniperus* spp (Juniper) leaf, and fruit of *Vaccinium macrocarpon* (cranberry) kills microbes or interfere with their adhesion to epithelial cells, thereby protecting against

acute and chronic UTI.[27] The roots of *Mahonia aquifolium* and *Hydrastis canadensis* are rich in berberine which acts against many bacteria and prevent infections by preventing the bacteria (*E. coli* and *Proteus* species) from adhering to the host cell, which suggests its role in UTI treatment.[28] In has been mentioned in various literature that, there are many Plants belonging to family Apiaceae, Fabaceae, Malvaceae, Asteraceae and Cucurbitaceae were found to be very effective against UTIs.[29] Many Herbs like *Gundelia tournefortii*, Eruca *sativa* and *Origanum syriacum* potentiate clarithromycin activity against the resistant *E. coli* strain.[30]

From dates back, cranberries have been used as a treatment for urinary tract diseases and Quinic acid suggested to be responsible for excretion of hippuric acid in urine which is an antibacterial agent and also has the ability to acidify the urine.[31] *Arctostaphylos uva ursi* is a useful herb for bladder infection. Preparations made from them reported to have significant antibacterial activity and astringent activity due to its diuretic properties. Diuretic herbs like *Asparagus officinalis, Elymus repens, Solidago virgaurea* and *Equisetum arvense* used UTIs by increasing urinary volume and removing bacteria out of the urinary tract.[32]

Root extract of *Hemidesmus indicus* and seed extract of *Hemidesmus indicus* and *Punica granatum* were reported to have urobactericidal activity against different uropathogens.[33,34]

A Kumar et al, studied the antibacterial activity of allicin from Allium sativum against antibiotic resistant uropathogens and found suitable for UTIs.[35]

Karandikar GK et al, Studied that Moringa oleifera decoction is used for symptomatic help in UTIs because of the antibacterial property.[36] Kumbhare MR et al, estimated the of total phenolic content, cytotoxicity and in vitro antioxidant activity of stem bark of Moringa oleifer and it was found that it represses adherence of microorganisms to the mass of the bladder by sloughing them off in urine.[37]

Goskshur was traditionally used by ayurvedic vaidyas as a mild laxative, diuretic, urolithiasis, dysurea for treatment of urinary tract problems including cystitis, stones and infections. Anitha.K et al. studied all parts of T. terrestris in central Asia and found antibacterial movement against enterococcus faecalis, streptococcus aureus, Escherichia coli, and pseudomonas aeruginosa.[38] Priya Bhat et al, observed that in lower urinary tract infection, Shweta Parpati et al, showed marked relief for the symptoms.[39]

Challenges

The exact mechanism of herbal drugs used to treat UTI is complex and till date not clearly interpreted and understood due to lack of scientific data and clinical research. Herbal medicines are also associated with some side effects and toxicity due to the poor quality of the raw materials and formulations. Complexity and non-uniformity of the ingredients in herbal medicines are big challenge which affects the quality of herbal medicines.[40]

CONCLUSION

The line of treatment in *Ayurveda* is mainly focused on *Dosha Chikitsa* i.e., treatment. In Urinary tract infection treatment with antibiotics are effective but the problem is of development of resistance for the pathogens and reoccurrence of infection. This suggests the searching of an alternative and safe therapy. Herbal treatment mentioned in Ayurvedic texts are proven and time tested. The herbs used in UTI's would help to excrete toxins from the body, maintain pH of the urine and also act as immunomodulator.

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