IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Review Article
August 2021 Vol.:22, Issue:1
© All rights are reserved by Ekta Khare et al.

A Review on Natural Therapeutics for Urinary Tract Infection

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Ekta Khare*, Nayenika Solanky, Anurima Choudhury, Ayushi Rathore, Radhika Gopichandani

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, I.T.M. University, Gwalior (M.P.), India P.O. Box: 474001

Submitted: 23 July 2021
Accepted: 29 July 2021
Published: 30 August 2021

HUMAN JOURNALS
www.ijppr.humanjournals.com

Keywords: Herbal, Urinary tract Infection, Medication, Natural therapeutics, Resistance, Antibiotics

ABSTRACT

INTRODUCTION- Urinary tract infection is a serious global concern. Some microbial contamination takes place in urinary tract and causes urinary tract infection. Those microbial agents are ***Escherichia coli, Proteus mirabilis***. Nowadays any kind of treatment is more dependable on natural products. So, a number of natural products have been proved to treat urinary tract infection for its significant effects. **BACKGROUND-** Most of the people nowadays are suffering from urinary tract disease which is a very serious concern. As allopathic drugs which are used to treat UTI have many adverse effects, it is very high time that we have to look for some alternative solution. There herbal drugs come into its roll without harmful side effects and reliability and cheap availability. Many natural products such as cranberry, bearberry, cinnamon used in treatment of urinary tract infection. Any kind of microorganism, which sticks in the bladder can be prevent by cranberry. Bearberry contains glycosides which are transformed into hydroquinone that has antimicrobial properties. **CONCLUSION-** Herbal drugs are very effective on the first sign of infection using combination of vitamins, trace elements, sugars along with other antibiotics are very effective at UTI whereas if we use probiotics, which have very serious issue of overdosage and the prevalence effect of antibiotic -resistance microorganisms. So, herbal drugs are the best and safest way to cure UTI without affecting health.

INTRODUCTION –

Urinary tract infections are one of the most common types of bacterial infections worldwide. It's estimated that over 150 million people contract UTIs each year.

The Overuse of antibiotics can have long term negative consequences such as damage to the normal, healthy bacteria in urinary tract and also contribute to the development of antibiotic resistance strains of bacteria. So, in this review paper we are going to discuss what are those natural products that can be used to treat UTI to avoid excessive exposure to antibiotic drugs.

i. Bearberry leaves are an herbal remedy for UTIs that has been used in traditional medicine practices for centuries. ARBUTINE is the main compound of bearberry leaf which has a strong antibacterial effect on *E. coli*.

ii. Cranberry juice and supplements are safe for most people. According to 2019 review it can help reduce UTI occurrence and UTI symptoms in some cases. But more human studies are required to understand the roll of cranberry products in the treatment of UTIs.

iii. Cinnamaldehyde extract from cinnamon are an volatile oil which are abled to inhibit microorganism formation of *E. coli*.

We are going to briefly about many more natural products to treat UTI in our review paper.

1. What is UTI-

Urinary tract infection (UTI) means the path where the urine flows that will be infected by any microorganisms. This tract made up of kidney (where urine formed), ureter (where urine flow), bladder (where urine store), and urethra.

The main causative agent of urinary tract infection is ***Escherichia coli.*** Other agents that also can cause urinary tract infection are ***Proteus mirabilis*** and ***Klebsiella pneumoniae***. These agents enter in urinary tract through urethra and form colonization in bladder and ureter. These agents are basically present in stomach or intestine and it excreted through rectum. In female anatomy structure, distance between rectum and urethra is very less so that those agents can enter in urethra easily. After entering they start infecting the further organs of urinary tract like bladder and ureter.

Urinary tract infection (UTI) can be divided in two parts-

1. Lower urinary tract infection

2. Upper urinary tract infection

1.1 Lower urinary tract infection-

If the microbial contamination take place in bladder and urethra that is known as lower urinary tract infection. In female the length of urethra is smaller than male which is also a causative factor of urinary tract infection. Lower urinary tract infection is not severe as compared to upper urinary tract infection. The symptoms of lower urinary tract are – frequency of urine will be increased, burning sensation while urination, blood present in urine. In some emergency cases urine will be cloudy and pains while urination.

1.2 Upper urinary tract infection-

If microbial contamination take place in kidney and ureter then that is known as upper urinary tract infection. This infection is very severe as compare to lower urinary tract infection. Symptoms of upper urinary tract infection are fever, nausea, vomiting and pain in upper back.

The symptoms of different part of urinary tract which get infected are-

i. **Kidney** (acute pyelonephritis) – high fever, nausea, vomiting.

ii. **Bladder inflammation** (cystitis)- lower abdomen discomfort, blood in urine

iii. **Urethra** (urethritis) – burning while urination

2. Causative factors of urinary tract infection (UTI)-

- **Infected bladder-** ***ESCHERICHIC COLI*** can easily infect bladder if it is already contaminated. ***E.coli*** can get a suitable medium for contamination in infected bladder.

- **Infected urethra-** Urethra is closely situated to vagina so that it can spread the infection more.

- **Blockage of urinary tract-** blockage of urinary tract can be possible by kidney stone.

- using of catheter and stent use in stone are also major causative factor of urinary tract infection.

- Female anatomy structure like short length of urethra and short distance between rectum and urethra – these are causative factor of urinary tract infection.

Menopause is also a causative factor of urinary tract disorder.

3. Importance of HERBAL PRODUCTS in UTI-

Now a days some natural products are more safe than modern science treatment method. They have less side effects and also effective to all age group of patients. This herbal product helps the body to come a natural balance so that the body can heal itself. Natural products contain an active ingredient, this active ingredient contain the therapeutic effects. This active ingredient helps to protect the microorganism contamination.

In urinary tract infection, medicinal teas help to treat bladder and kidney, because after drinking teas water consumption is taking place in body.

Those herbal drugs are useful in urinary tract infection are followings-

1. ***Vaccinum macrocarpon***

Figure No. 1: *Vaccinum macrocarpon*

Cranberry is a term derived from the contraction of ‘crane berry’. The cranberry is part of the Ericaceae family. The Cranberry is mainly found in North America. Flowers of Cranberry are

dark pinkish in colour with definite impulsive petals, leaving the style and stamens reveal and pointing forward. The fruit is a berry that are bigger than the leaves. The fruits begin with white, but later it turns into deep reddish in colour when berry is fully mature. It is dietary, with an acidic taste that can overcome its sweetness. From a long time fruit has been used as a herbal remedies recorded as back 17th century. The most important use of cranberry is to treat infections of the urinary tract, includes kidneys and bladder.

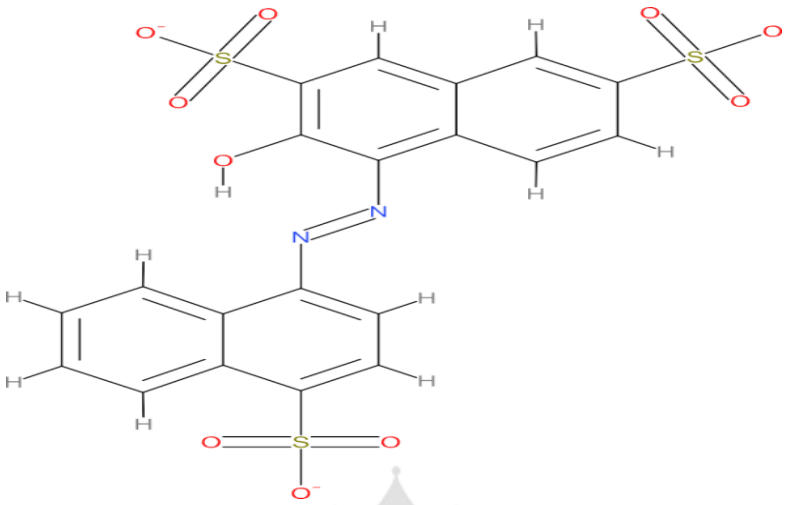

Figure no. 1.1 *Vaccinum macrocarpon*

The main compounds present in cranberry that gives medicinal activities are proanthocyanidins, which are powerful types of antioxidants.

1.1 Protection against (UTI)

Taking cranberry juice or pills orally can help to stop infections and may specially work against the bacteria *Escherichia coli* (*E.coli*). Nowadays, research shows that it's not because of the acidity of the cranberries, but atypical nature of the presence of proanthocyanidins (PACs) that is related to prevention of Urinary tract infections (UTIs). The type of bacteria included are of pathogenic strains of E. coli – which is one of the most common microorganisms involved in UTIs. By making it tough to grip onto the urinary tract linings, cranberry's PAC helps stop the growth of bacterial populations that can result in completely infection.

The current hypothesis is that cranberries work principally by preventing the adhesion of type -1 and p- fimbriae strains to the urothelium. one possible mechanism is that the cranberry compounds, acting as receptors analogs competitively inhibit the adhesion of *E.coli*.

Figure no.: 2 Arctostaphylos Uva ursi

2. Arctostaphylos Uva ursi

It is Greek word derived from "bear," and staphylos Greek word derived from "a bunch of grapes". Its common name is red bearberry leaf. Roots are developed from the stem, and the plant expands, by forming a wide, giant and ground covering. The leaves turn bronze colour in the winter month. The berries of Uva-Ursi are reddish in colour. The dried leaves are the only important part of the plant used in medicine.

The main chemical composition of the Uva-ursi herbs is glycosides likes arbutin. Constituents – phenolic glycosides, arbutin (hydroquinone glycosides), methyl arbutin, tannins. It also contains vitamin A, iron, manganese, selenium and silicon in its components. Recently discovered that uva ursi has property to inhibit the tyrosinase by a 50% alcoholic extract. This result can reduce melanin synthesis, which leads the researcher to advise that it could be used as a whitening agent for the skin. The leaves of the bearberry have been used as external and internal uses.

2.1 Protection against UTI -

Arbutin fights infection, pain irritation and diminish inflammation during urination. The tea or extract can be used in treating nocturnal enuresis as well. Uva- Ursi has been reported to be most effective against *E. coli*. The antimicrobial activities appear to be in part due to the

volume of aqueous uva ursi extracts to change the microbial cell surface qualities. In a study of forty Escherichia coli (*E.Coli*) strains segregate from urine of patients suffer from pyelonephritis, uva ursi notably increased the hydrophobicity of the microbial cell surface, decreasing the ability of bacteria to adhere to the host. Uva ursi also appears to have diuretic and anti-inflammatory effects. An animal study found uva ursi significantly increased urine output without affecting sodium or potassium excretion. In another animal model, uva ursi extracts and arbutin isolate demonstrated inhibition of inflammation, both alone and as an additive effect with prednisolone. Uva ursi works most effectively in basic pH of urine, so it is finest choice not to use with supplements that might acidify the urine, such as cranberries or vitamin C. This herb is contraindicated during pregnancy, as it may stimulate uterine contractions. Excess intake of Uva-Ursi cause nausea, vomiting, ringing of the ears and convulsions.

3. Hydrastis canadensis

Figure no.: 3 *Hydrastis canadensis*

Ground raspberry is a tiny perpetual herb. It has a strong good odour and bitterness in taste. It doesn't produce fruits, similar to raspberry aspects and also it is not edible. Common name – bearberry leaf (berberis vulgaris), Goldenseal. Ground raspberry plant and its root contains active components like Isoquinoline alkaloids (berberine, hydrastine).

Ground raspberry is most important because it improves health condition in many ways. its pungent properties make it helpful to treat some of the conditions like throat, stomach and vagina when the tissue is swollen, itchy, burning or infected. It is also useful in eyewashes for simple conjunctivitis. As an anti-inflammatory and anti-microbial astringent, ground raspberry. It is used as the first sign and symptom of respiratory disorder like cold or flu. It may also reduce fever, relives congestion and excess mucous. External application is also available for the treatment of skin disease such as psoriasis, herpes and ringworms.

3.1 Protection Against UTIs –

Berberine is a plant alkaloid with a long time history of medicinal use. The extract compounds and decoction of berberine evidences notable anti-microbial activity against species of organism, includes bacteria, virus, fungi, protozoans, helminths and many others. In UTI infections, the anti-infectious activity of berberine is believed due to its capability to obviate adhesion to the uroepithelial cells. In the ex- vivo/ in-vitro studies, a urinary pathogenic strain of Ground raspberry plant and its root contains active components like Isoquinoline alkaloids (berberine, hydrastine).

Ground raspberry is most important because it improves health condition in many ways. its pungent properties make it helpful to treat some of the conditions like throat, stomach and vagina when the tissue is swollen, itchy, burning or infected. It is also useful in eyewashes for simple conjunctivitis. As an anti-inflammatory and anti-microbial astringent, ground raspberry. It is used as the first sign and symptom of respiratory disorder like cold or flu. It may also reduce fever, relives congestion and excess mucous. External application is also available for the treatment of skin disease such as psoriasis, herpes and ringworms.

Escherichia coli was isolate from the infected person and cultured. The strain grown in culture for 18 hrs., an electron microscope showed *E.coli* is heavily covered with the fimbrial filaments.

4. *Agathosma betulina*-

Figure No. 4: *Agathosma betulina*

It is commonly found in the area having wet low elevations in the western portion of South Africa. Family – Rutaceae, Common name – Bucco, buchu, Bookoo. Bucco is a shrub type

that grows to almost 2 m tall, and have reddish brown to violet-brown bark. The leaves are of pale greenish colour, leathery and glossy, with blunt ends, strong- curved tip and fine toothed margin, with round oil glands scattered through the leaf that give the plant oily and wet appearance. The leaves have a strong aromatic taste and peppermint- menthol like odour. Flowers are white or pale pinkish, tiny and have a characteristics star shape.

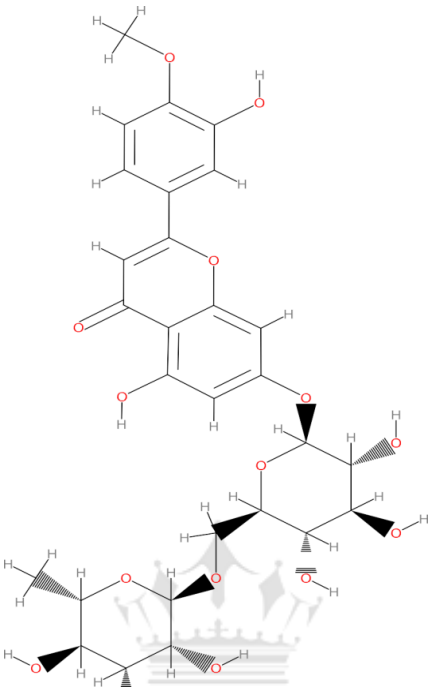

Figure no.: 4.1 Agathosma betulina

It contains flavonoids mostly diosmin, mucilage, and resin. Sulphur containing compounds include 8- mercapto-p-methan-3-one (buccha mercaptan), are responsible for the essential quality Ribes Nigrum flavour. This is useful in all diseases of the urinary organs, appears with increased uric acid, an irritation of the bladder and urethra attending gravel in mucous membrane of the urinary bladder, and unrestraint connected with prostrate disease. It is also recommended in dyspepsia, cutaneous infections, dropsy and chronic rheumatism.

4.1 Protection against UTIs -

Bucco is a curious herb and is primarily used in the treatment of chronic disease of genital and urinary tract like chronic inflammation of mucous membrane of the bladder and urethra, conditions where the urinary discharges and unusually acidic urine, and unrestraint linked prostrate disease. Bucco leaf is a diuretics and urinary tract antiseptic, another activity is considered to be due to its essential oil content.

The oils that we get from Bucco is pleasant to Ribes nigrum taste and are responsible for the ability to kill bacteria present in urinary tract. The oils which is absorbed by the stomach and excreted through kidneys into the bladder and urethra, they kill bacteria as they go. Science has explained that Bucco is a urinary tract disinfectant of the accurate sort.

Figure no. 5: *Echinacea purpurea*

5. *Echinacea purpurea*

It is a genus of herbaceous flower plant in the daisy family. Common names- snakeroot, red sunflower. Its family is Asteraceae. These plants are native to eastern and central North America, where these are found growing in moist to dry grasslands and open wooded areas. They have large, splashy heads of composite flowers, purple in colour, blooms from starting to end season of summer. It has a Faded aromatic smell, with a sweetish taste, leaving an itching sensation in the mouth. Some variants are used in herbal remedies and some are cultivated in gardens for showy (showpiece) flowers.

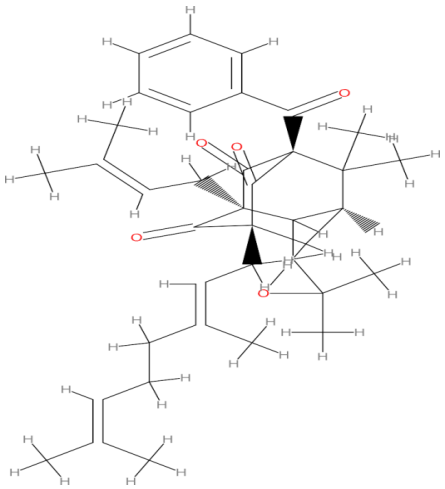

Figure no.: 5.1 *Echinacea purpurea*

It is used against many other infections includes the flu, UTIs, vaginal yeast infections, genital herpes, bloodstream infections, gum disease, tonsillitis, streptococcus infections, syphilis, typhoid, and malaria. Sampson is one of the most popular herbs and has been widely studied for its effects on the immune systems. It has been used as an immunostimulant for a variation of disorders. A number of in vitro animal studies have shown that Sampson appears to increase immunologic activity by increasing levels of interferon and may increase phagocytosis.

Protection against UTIs -

Sampson gives strength to the immune system and acts as an anti-inflammatory providing instant relief to the inflammation sensation that often coincide with UTI. The important thing of using Sampson is the onset of symptoms. This herb can be used with care because it may have some contraindications or side effects.

Active Constituents of the plant include minerals like silicic acids and silicates, potassium, sulphur, magnesium; flavonoids: quercetin glycosides; phenolic acids, alkaloids, equisetonin, phytosterols: cholesterol, isofucosterol, campesterol; tannins. Horsetail is known for its anti-inflammatory, antinociceptive, antioxidant, anti-proliferative, antimicrobial, hepatoprotective, anti diabetic and coagulant, diuretic and astringent activity.

6. *Equisetum arvense*

Horsetail is a perennial herb which grows in moist loamy or sandy soil found in most of the North American continent. Horsetail is a unique plant, the morphology of those herb is peculiar and the plant has creeping or string like rootstock which gives it its name. The roots at the nodes are turned into multiple number of hollow stems of two kinds. The above ground part of horsetail is used as medical remedies.

Figure no.: 6 *Equisetum arvense*

It grows in two stages, initial growth of the is through a fertile and flesh colored stem, this stem can grow to a height of almost 10 cm to 17 cm and comes out a cone like spike - this spike structure which contains spores in the plant. The initial stem doesn't last long, shrink and wrinkles away. The second stem is a green and sterile structure reaching a length of 45 cm in height and overtop crowned by whorls of small – small branches this is the final shape that the plant will take for its life span.

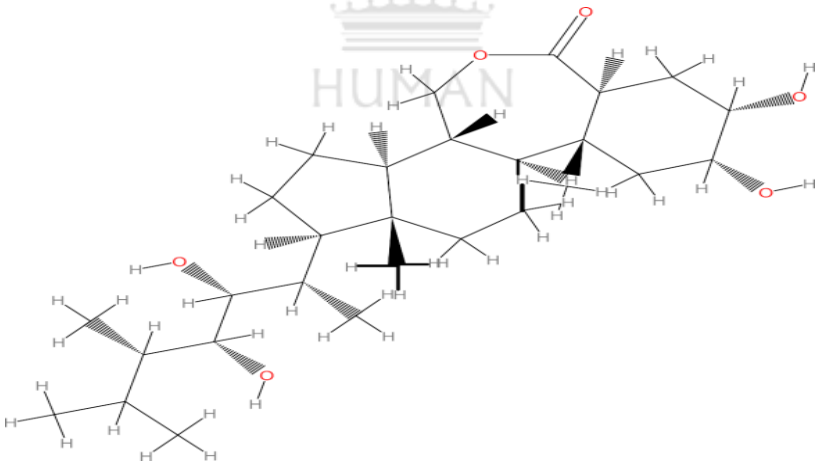

Figure no.: 6.1 *Equisetum arvense*

Constituents of the plant include minerals like silicic acids and silicates, Others are calcium carbonate, calcium phosphate, potassium sulfate, potassium chloride, manganese, sulphur, maganese chloride, iron, flavonoids: quercetin glycosides; phenolic acids, alkaloids, equisetonin, phytosterols: cholesterol, linolenic acid, linoleic acid, oleic acid, steric acid. It has traditionally been used as a diuretic which reduce mild edema and helps the body to get rid of excess fluid by increasing urine output. It helped in wash out bacteria present in urinary

tract. It is used in edema, urinary tract infections, urinary incontinence and so more.

Horsetail is known for its anti-inflammatory, antinociceptive, antioxidant, anti-proliferative, antimicrobial, hepatoprotective, anti diabetic, and coagulant, diuretic and astringent activity.

Protection against UTI -

The Horsetail plant is one of the best herbal remedies for UTIs. Horsetail has many properties like astringent, diuretic and tissue healing properties which allow it to effectively fight UTIs. The diuretic property is due to the presence of equisetonin and flavone glycosides present in the Horsetail. Horsetail has been used for long period of the people of ancient Romans, Greeks, and native North Americans for the treatment of kidney stones and urinary bladder problems. In the early 19th century, it was also used for treating prostatitis, urinary unrestraint and gonorrhea. According to the study, having horsetail tea thrice a day can helped person suffering from uric acid, kidney stones, urethra disorders and urinary tract infection (UTI).

Figure no. 7 *Juniperus communis*

7. *Juniperus communis*

This is a variant of small tree or shrub in the genus Junipers. This evergreen conifer has the huge geographical range of any woody plant, with a circumpolar distribution all over the cool temperature in Northern Hemisphere in North America, Europe and Asia.

Juniperus is carrying in form, range almost from 10m to rarely 16 m tall. It has needle like leaves structure in whorls of three; the leaves are green, with a white single stomatal band on the inner side surface. It never achieves adults foliage.

The fruits are berry like cones, at first it is green, matures in 2 ½ years to purplish – black with a blueish waxy coating, this are spherical, 4 to 12 mm diameter, and generally have

three fleshy fused scales in each scale there is single seed. The males cones are yellow and 2 – 3 mm long and fall soon after dismiss their pollen in March – April month.

From the long-time Junipers used as medicines by many cultures includes the Navajo peoples. Western American tribes combine the berries of Junipers with Berberis root bar in herbal tea. Endemic Americans also used Junipers as female Contraceptives.

Berries of Juniperus are part used for medicinal uses. It has diuretics activities. It was described that terpenoids present in the leaf of the herbs are responsible for the activities like anti-bacterial and diuretics properties of the herbs. Schiller described that the Juniper oil present in the Junipers was effective against urinary tract infections. Leaf and berries of this plants shows antimicrobial properties against urinary tract infections. The main constituents of this plants herbs is terpinen-4-ol, a essential oil having a antibacterial properties and plays an important role in the treatment of UTIs. The essential oil of Juniper increases the rate of kidney filtration so that it increases urine flow and helped to flush out offend and distress bacteria. The plants also contain other active component like oxygenated sesquiterpene, Beta – pinene, Sabine, Monoterpenes Hydrocarbons, limonene, and myrcene. It should be recognized that the volatile oil of Juniper contains nephrotoxic compounds, mostly hydrocarbon terpenoids. It was in fact previously reveals that the extracts represent diuretics activity. The Juniper leaves inoculate show more diuretics activity rather than essential oils which advise that other constituents contribute to the diuretics properties of the herbs.

8. *Urtica dioica*

Figure no.: 8 *Urtica dioica*

It is an herb plants and perpetual flowering plant originally endemic to Europe, and much of temperature and climatic conditions of Asia and Western North Africa. It is nowadays found worldwide along with New Zealand [2] and North America. The variant of Urtica divided into 6 sub species, 5 of which have many hollow stinging hairs called trichomes on the leaves and

stems, which acts like a hypodermic needle, injecting histamine and other chemicals that produce a stinging sensation upon contact dermatitis. From a long time, these plants use as a source of traditional medicines, food and tea in an ancient societies such as “Saxons”.

It has been frequently used for treatment of several disease such as arthritis, rheumatism, UTI, kidney stones and periodontal. It can be used as a diuretics for kidney inflammation and the plant herb is used to treat chronic bladder infections. This plant having anti-inflammatory properties and it was manifest that the plant extracts exhibit anti- microbial properties against numerous Gram- positive and Gram- negative bacteria such as *Bacillus subtilis, Lactobacillus plantarum, P. Aeruginosa, E. Coli, K. Pneumoniae, S. Aureus* and *S. Epidermis* Many people use stinging nettle to treat urinary problems during the early stages of an enlarged prostrate. An enlarged prostrate is also called benign prostratic hyperplasia. Nettle herb can help the body scatter increase amount of salt and water, which can lower blood pressure for short term. Study of enlarged prostrate signify that the urtica extract can help to treat short lived and long lived urination problem and urinary tract related problems. It should be well known that the role of Urtica in the treatment of urinary tract infection perhaps due to the diuretics properties of herb.

9. *Cinnamonum verum*

It has evergreen tree vernacular to Sri Lanka. Cinnamon has unique smell colour and flavor results from the oily part of the trees that grows from the health benefits comes from the bark of essential oils. Cinnamon shows anti-oxidants and anti- bacterial activities. Cinnamon has powerful antifungal properties that could be an effective in treating and preventing candida overgrowth in the digestive tract studies have shown that cinnamon can lowers the amount of dangerous candida albicans which is known a yeast causes candidiasis and fungal and cause a variety of digestive and autoimmune issues. It contains bio – equivalent phytochemicals compounds such as trans- cinnamaldehyde, eugenol, proanthocyanidins and trans – cinnamyl acetate. The constituents of proanthocyanidins present in cinnamon is responsible for the treatment of UTIs. Trans – cinnamaldehyde extracts are a volatile oil which are able to inhibit micro-organism formation of *E.Coli* on urinary catheters by down regulating major malignity genes in the bacteria developed in the person suffer from urinary tract infections. Several mechanism are involved in anti- bacterial activities of essential oils:

- Cinnamon has their hydrophobic properties, these molecules could target the lipid –

containing bacterial cell membranes and mitochondria and alter the permeability which finally leads to leakage of ions and other cell content.

- Inhibiting generation and glucose uptake, and
- Inhibiting activities of important enzymes such as amino acid decarboxylase.

10. *Allium sativum*

The urinary tract infections are one of the major health concerns affecting mostly women. Pure Garlic is known as "Heavyweight" among all herbal remedies because it has strong anti-bacterial properties and is useful in treating different types of disease includes urinary tract infections. Taking on curing the ailment and analysis shows that garlic is an excellent medicine to treat urinary tract infections.

From the long time Garlic is known to contain anti-bacterial activities as assign to its potential to prevent inflammation and provide immune support. Tincture or extract of garlic may be an efficacious weapon against multidrug resistance strains of pathogenic bacteria related with urinary tract infections. Chewing garlic contains allicin and has anti-microbial and anti-inflammatory properties that not only reduce UTI problem but eliminate its cause that is the *E.coli* bacteria which is the prime reason for this disease.

Drug interactions –

Garlic supplements are best and safe choice for most people, but side effects may involve heartburn, halitosis and unpleasant body odour. Some people may experience allergic reactions to interact with some medication such as HIV and Anti- coagulants.

CONCLUSION:

Urinary tract infections are the second most common bacterial infection with a potential risk for complications such as renal scaring. Appropriate diagnosis and management is important, which is aimed at treating the acute episode as well as preventing recurrences. Plants are scientifically proven to possess novel compound with antimicrobial properties and can be a great therapeutic significance for treatments. These traditional resources will help us in preventing these common yet discomforting ailments.

S.No.	Common name	Binomial nomenclature	Active constituent	Mode of Action
1.	Horsetail	*Equisetum arvense*	equisetonin	diuretics
2.	Raspberry	*Hydrastis canadensis*	berberine	antimicrobial
3.	Cranberry	*Vaccinum macrocarpon*	anthocyanin	antibacterial
4.	UVA URSI	*Arctostaphylos UVA URSI*	Glycosides, allantoin, flavonoids	astringent
5.	Cinnamon	*Cinnamon verum*	eugenol	Antioxidant and antibacterial
6.	Garlic	*Allium sativum*	Organic sulphur compounds	antimicrobial
7.	Bucco	*Agathosma betulina*	Flavonoids and resins	Anti inflammatory
8.	Snake root	*Echinacea purpurea*	Monoterpene indole alkaloids	Anti-inflammatory
9.	Juniper	*Juniperus communis*	Monoterpene hydrocarbon	antimicrobial
10.	Stinging neetle	*Urtica dioica*	Formic acid, histamine, acetylcholine	antimicrobial

ACKNOWLEDGEMENT:

We acknowledge fervent gratitude to the management of ITM University, Gwalior for providing necessary resources for completion of this work. Thanks to our mentor Professor Ekta Khare for her constant guidance and helpful suggestions during the preparation of this manuscript.

REFERENCES:

1. Neto CC, “Cranberry and its phytochemicals: a Review of in Vitro Anticancer Studies”, Nutrition, Edition- 2007, 137(1s), Pages: 86S-193S.
2. Parry J, Su L, Moore J, Cheng Z, Luther M, Rao JN, Wang JY, and Yu LL, “Chemical Compositions, Antioxidant Capacities, and Antiproliferative Activities of Selected Fruit Seed Flours”, Agric Chem, Edition- 2006, 54(11), Pages: 3773-3778.
3. Lipson SM, Sethi L, Cohen P, Gordon RE, Tan IP, Burdowski A, and Stotzky G, “Antiviral Effects on Bacteriophages and Rotavirus by Cranberry Juice”, Phytomedicine, Edition- 2007, 14(1), Pages: 23-30.
4. Ruel G, Pomerleau S, Couture P, Lemieux S, Lamarche B, and Couillard C, “ Favourable Impact of Low-Calorie Cranberry Juice Consumption on Plasma HDL Cholestrol Concentrations in Men,” Br J Nutrition, Edition- 2006, 96(2), Pages: 57-364.
5. Avorn J et al., “Reduction of Bacteriuria and Pyuria After Ingestion of Cranberry Juice,” JAMA, Edition- 1994, 271(10), Pages- 751-754.
6. Lis-Balchin M, Hart S, and Simpson E, “Essential Oils: Their Pharmacological Action on Guinea- pig Ileum and Antimicrobial Activity on Microorganisms,” J Pharm Pharmacol, Edition- 2001, 53(4), Pages: 579-582.
7. Parejo I, Viladomat F, Bastida J, Codina C, “ A Single Extraction Step in the Quantitative Analysis of Arbutin in Bearberry (Arctostaphylos uva-ursi) Leaves by High-performance liquid Chromatography”, Phytochem Anal, Edition- 2001, 12(5), Pages: 336-339.
8. D Fleurentin, J Mortier, “Effect of Extracts of Orthosiphon Stamineus Benth, Hieracium Pilosella L Sambucus Nigra L. and Arctostaphylos uva-ursi (L.) Spreng in”, Phytother Res, Edition- 1999, 13(3), Pages: 222-225.
9. Inbaraj JJ, Kukielczak BM, Bilski P, “Photochemistry and Photocytotoxicity of Alkaloids from Goldenseal (Hydrastis canadensis L.), Palmatine, Hydrastine, Canadine, and Hydrastinine”, Chem Res Toxico, Edition- 2006, 19(6), Pages: 739-44.
10. Clement-Kruzel S, Hwang SA, Kruzel MC, Dasgupta A, Actor JK, “Immune Modulation of Macrophage Pro-Inflammatory Response by Goldenseal and Astragalus extracts. J Med Food”, Edition- 2008 Sep, 11(3), Pages: 493-8.
11. Hwang BY, Roberts SK, Chadwick LR et al., “Antimicrobial Constituents from Goldenseal (the Rhizomes of Hydrastis canadensis) Against Selected Oral Pathogens”, Planta Med, Edition- 2003, 69(7), Pages: 623-7.
12. Scazzocchio F, Cometa MF, Tomassini L et al, “ Antibacterial Activity of Hydrastis Canadensis Extract and Its Major Isolated Alkaloids”, Planta Medicinal, Edition- 2001, 67(6), Pages: 561-564.
13. Sun D, Courtney HS, and Beachey EH, “ Berberine Sulfate Blocks Adherence of Streptococcus Pyogenes to Epithelial Cells, Fibronectin, and HeHexadecane Antimicrobial Agents and Chemotherapy”, Edition- 1988, 32(9), Pages: 1370-1374.
14. Head KA, “Natural Approachs to Prevention and Treatment of Infections of the Lower Urinary Tract”, Altern Med Rev, Edition- 2008, 13(3), Pages: 227-244.
15. Larsson B, Jonasson A, Fianu S, “Prophylactic Effect of UVA-E in Women with Recurrent cystitis,” A Preliminary Report Curr Ther Res, Edition- 1993, 53, Pages: 441-443.
16. V. N Samorodov, S. V. Pospelov, G. F. Moiseeva and A. V. Sereda, “Phytochemical Composition of Plants Echinacea(Echinaceae Moench) and Their Pharmacological Properties”, Khim Farm Zh, Edition- 1996, 30(4), pages: 32-37.
17. Mortensen Nikolaj, “Studies in Urinary Tract Infections”, Acta Medica Scandinavica, Edition-2009, 186 (1-6), Pages: 47-51.
18. Dr. Nangare Nitin, “Pheochromocytoma: Presenting as Urinary Tract Infections”, Journal of Medical Science and Cilinacal Research, Edition-2017, 05 (02), Pages: 18239-18240.
19. Z.A, “Kidney and Urinary Tract Infections”, Urology, Edition- 1973, 1 (2), Page: 183.
20. Mabeck C.E, “Studies in Urinary Tract Infections”, Acta Medica Scandinavica, Edition-2009, 186 (1-6), Pages: 39-45.
21. Davidson Elyad, ”Prevention of Urinary Tract Infection with Vaccinum Product", Phytotherapy Research, Edition-2013, 28 (3), Pages: 465-470.
22. Loopuyt L, “Infections of the Urinary Tract", Acta Medica Sacndinavica, Edition-2009, 125 (3), Pages: 245-

255.
23.Yildirim Gulizar Julide, “Behaviours of Students who have repeated Urinary Tract Infections”, International Journal of Urological Nursing, Edition-2017, 11 (2), Pages: 90-97.