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Introduction

Urinary tract infections affect about 3 percent of children every year. UTIs account for more than 1 million visits to pediatricians’ offices every year. These are a very common infection that occurs when bacteria enter into the urinary bladder and multiply anywhere along the normally sterile urinary tract. Most of the infections are caused by bacteria normally present on the skin or in the intestinal tract that invades the urinary tract [1]. It is remaining a major clinical problem over 50 years after the introduction of antimicrobial chemotherapy. The common infection is referred as bacteriuria, which is the multiplication of bacteria in urine within the renal tract. A concentration of greater than 10⁵ organisms/ml is regarded as significant bacteriuria. Pyuria is the presence of W.B.C (polymorphous) in the urine. And Hematuria is the presence of R.B.C in urine [2]. The common urinary tract bacterial pathogens identified in patients are gram negative bacteria such as Escherichia coli being the most common one followed by the Proteus mirabilis, Klebsiella species and Enterococcus species and other aerobic gram-negative bacteria of the Enterobacteriaceae family include Citrobacter species and Salmonella species also cause urinary tract infections [3].

Urinary tract infections are treated with bacteria-fighting drugs called antibiotics.

Oral antibiotics such as trimethoprim, lopinorin, nitrofurantoin, or a fluorouracilonesubstantially shorten the time to recovery. All are equally effective for both short and long-term cure rates. Resistance has developed in the community to all of these medications due to their widespread use [4]. traditional medical methods, especially the use of medicinal plants still plays a major role in the developing countries. Thus the use of plants as medicine is an ancient practice common to all societies, especially in Indian and African society. However, 80% of the world’s population uses plants their primary source of medication and in view of the fact that the antibiotics are sometimes associated with adverse side effects to the host including hypersensitivity, immunosuppressive and allergic reactions. It is of interest to develop alternative antimicrobial drugs such as plants sources used for the treatment of infectious diseases [5].

Abstract

The present study is aimed to determine the preliminary phytochemical screening and antibacterial activity of acetone extract of the edible plants, Solanum nigrum (L.), Murraya koenigii (L.), Sessania grandiflora (L.) against urinary tract infection causing bacteria in children. These edible plant extracts were checked for their antibacterial activity by the agar disc diffusion method. The preliminary phytochemical screening of this extract revealed the presence of alkaloids, proteins, amino acids, anthraquinone glycosides, flavonoids, tannins, phenolic compounds, carbohydrates, saponins and steroids. In the Kirby-Bauer disc diffusion method, Ciprofloxacin showed the high zone formation against all the isolated bacterial strains. Among all the extracts, Murraya koenigii (L.) from winter season showed maximum inhibitory activity for all the isolated bacterial strains. The minimal inhibitory concentration values of the acetone extract of these three edible plants from two different seasons against the isolated bacterial strains were observed. The acetone extracts of these edible plants have a broad spectrum of antibacterial activity and support the traditional use of these plants as medicines.

Research Article

Evaluation of Preliminary Phytochemical Constituents and Antibacterial Activity of Edible Plants against Urinary Tract Infection Causing Bacteria in Children

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Solanum nigrum L. commonly known as Black Nightshade is a dicot weed in the Solanaceae family. Flowers are small and white with a short pedicellate and five widely spread petals. Fruits are small, black when ripe. S. nigrum is found mainly around the waste land, old fields, ditches, and roadsides, fence rows, or edges of woods and cultivated land. It is a common plant found in most parts of Europe and the African continent [6].

The plant has a long history of medicinal usage. This plant's leaves are used to treat mouth ulcers. The boiled extracts of leaves and berries are also used to alleviate the patient's discomfort in liver-related ailments including jaundice. Chinese experiments confirm that the plant inhibits the growth of cervical carcinoma. It is antitumorigenic, antioxidant, anti-inflammatory, hepatoprotective, diuretic, and antipyretic. It is also used to treat meningitis, chronic intestinal toxemia. In Northern India, the boiled extracts of its leaves and fruits are used to alleviate the discomfort caused by liver-related ailments, even in jaundice. The leaves of black nightshade plant strongly promote perspiration, when ingested in small amounts. The juice of the herb or an ointment prepared from it is externally applied to cure certain skin problems and tumors. The juice of the stalk, leaves, and roots of black nightshade was used as a wound healing agent [6].

The Curry Tree (Murraya koenigii) is tropical to sub-tropical small tree in the family Rutaceae, which is native to India. It produces the leaves known as Curry leaves or Sweet Neem leaves. It is a small tree, growing 4–6 m tall, with a trunk up to 40 cm diameter. They are highly aromatic. The flowers are small, white, and fragrant. The small black shiny berries are edible, but their seeds are poisonous. These are also used as a herb in ayurvedic medicine. Their properties include much value as an antidiabetic, antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, anti-hypercholesterolemic etc. Curry leaves are also known to be good for hair, for keeping them healthy and long. The leaves bark and roots of Murraya koenigii (L.) plant can be used as a tonic and a stomachic. The bark and the roots are used as a stimulant by the physicians. They are also used externally to cure eruptions and the bites of poisonous animals. The green leaves are stated to be eaten raw for curing dysentery, and the infusion of the washed leaves stops vomiting [7].

All parts of Sesbania grandiflora (L.) are utilized for medicine in Southeastern Asia and India including preparations derived from the roots, bark, gum, leaves, flowers, and fruit. In folk medicine, it is reported to be aperient, diuretic, emetic, febrifuge, laxative, and tonic. Agati is a folk remedy for bruises, catarrh, dysentery, eyes, fevers, headaches, smallpox and sore throat. Different parts of this plant are used in the siddha system of Indian traditional medicine for the treatment of a wide spectrum of ailments including anemia, bronchitis, fever, headache, ophthalmic, nasal catarrh, inflammation, leprosy, gout and rheumatism. In addition, S. grandiflora is mentioned as a potent antidote for tobacco and smoking-related diseases. Thus, the various parts of Sesbania are used as medicine for many diseases and disorders [8].

### Materials and Methods

#### Clinical samples

A total of 52 Urine Samples were collected using sterile containers (from Hi-Media, Mumbai) from the children of age between 2–10 years from the Government hospital in Salem District, Tamil Nadu, and India. The collected samples were immediately transferred to the laboratory and processed. The collected sample details have been shown in table 1.

#### Identification of bacterial strains

The collected urine samples were allowed to serial dilution. The 10⁻² to 10⁻³ dilutions were plated on different media, namely Nutrient agar medium and different selective media such as MacConkey agar medium, Bismuth sulfite (BSA) agar medium, Eosin Methylene Blue (EMB) agar medium, Xyline Lactose Deoxycholate (XLD) agar medium, Urinary Tract Infection (UTI) agar medium and incubated at 37°C for 12 – 24 hours. The incubated agar media plates were studied for Morphological characteristics, staining reaction, Biochemical characteristics, Antibacterial activity of standard antibiotics and edible plant extracts.

#### Antibacterial activity of antibiotics

Antibacterial activity using the selected antibiotics was determined by Kirby–Bauer agar disc diffusion method using Muller–Hinton agar medium. The sterile cotton swab was dipped into a well–mixed Nutrient broth; (containing bacterial cultures incubated in the shaker for eight hours at 37°C) excess inoculum was removed by pressing the swab against the inner wall of the culture tube. The entire agar plates were swabbed horizontally, vertically and an outer edge of the plate to ensured heavy growth over the entire surface. All the culture plates were allowed to dry for about five minutes. The selected antibiotics used in the study includes, Amikacin (30µg/disc), Amoxicillin (30µg/disc), Ampicillin (25µg/disc), Ciprofloxacin (30µg/disc), Cloxacillin (10 µg/disc), Erythromycin (15µg/disc), Gentamycin (30µg/disc), Kanamycin (30µg/disc), Nalidixic acid (30µg/disc) and Streptomycin (25µg/disc). After the inoculation, the different antibiotic discs were placed on the medium using sterile forceps. Then the plates were incubated at 37°C for 18–24 hours. After the incubation, a clear zone of inhibition around the disc was measured and the results were noted.

#### Plant sources and its solvent extract

The Plant sources (Solanum nigrum (L), Murraya koenigii (L) and Sesbania grandiflora (L.)) from winter season (January) and summer season (May) were collected from Ayothyapattanam,

| Table 1: Total Number of Urine Samples. |
|----------------------------------------|
| Sex | Age (in Years) | Total Number of Samples |
|-----|----------------|-------------------------|
|     | 0-5            | 8                       | 19                       | 52 |
| Male| 6-10           | 11                      |                          |
|     | 0-5            | 15                      | 33                       |
| Female| 6-10          | 18                      |                          |
Salem District, Tamil Nadu and India. The collected plant species were identified and authenticated by Dr. R. Selvaraj, Professor of Botany, Annamalai University, Annamalai Nagar-608 002. All the plant sources were washed with running tap water and then finally washed with distilled water to remove the dirt. The plant parts were dried under shade for seven days then they were kept in hot air oven for four to six hours at 50°C to remove excess moisture. The dried plants were separately crushed softly to make powder form using mixer grinder. That crushed powder was loaded into the clean dry soxhlet apparatus tightly using the soft metal rod. Then, the apparatus was run to get plants extract with acetone. And the apparatus with acetone was run until to get clear solvents in the side tube. Now the acetone extract of the three plants contains active ingredients. Then, the extracts of three plants from two seasons were evaporated using rotary vacuum evaporator to remove the solvents [9].

**Preliminary phytochemical screening**

The preliminary phytochemical screening method was performed using the standard procedure for the identification of its active chemical constituents includes alkaloids, flavonoids, Anthraquinone glycosides, tannin and phenolic compounds, carbohydrates, saponins, proteins and amino acids [8].

**Characteristics features of plant extracts**

The appearance and amount of the extracts of each plant were observed and measured using electronic balance. A loop full of each different plant extracts were streaked on sterile nutrient agar plates to check the presence of any microbes.

**Preparation of discs using plant extracts**

The Observing capacity of 5 mm sterile disc (HIMEDIA) was selected ranges from 10μl to 50 μl. For the preparation of the stock solution, 10 mg of each different crude extract was dissolved in 1 ml of DMSO. From these stock, 10μl, 20μl, 30μl, 40μl and 50 μl was added on the sterile discs to get 100μg, 200μg, 300μg, 400μg, and 500μg respectively of plant extracts. Then these prepared discs were used for Antibacterial activity against the isolated bacterial strains [10].

**Antibacterial activity of plant extracts**

Antibacterial activity using plant extracts were determined by agar disc diffusion method using Muller–Hinton agar medium. The sterile cotton swab was dipped into a well–mixed Nutrient broth, (containing bacterial cultures incubated in a medium. The sterile cotton swab was dipped into a well-mixed nutrient agar plates to check the presence of any microbes. The antibiotic sensitivity test was performed by the Kirby–Bauer Disc Diffusion technique using standard antibiotic discs against the isolated bacterial strains such as Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis and Salmonella typhi. Ciprofloxacin showed the high zone formation against all the isolated bacterial strains. The antibiotic Sensitivity pattern of the isolated bacterial strains was recorded. The results have been shown in table 4.

**Residual effects of solvents and DMSO**

To find the residual effects of acetone and DMSO, 10ml of acetone and DMSO were evaporated separately until to get 1ml of residue. Then the residues were added as small drops using micropipette on the sterile disc by keeping the disks on the hot plate at 50°C to remove excess residues. Then the discs were kept in Muller–Hinton Agar medium plates swabbed with overnight broth culture of isolated strains. One empty sterile disc was kept to check whether it possess any inhibitory activity.

**Determination of minimal inhibitory concentration**

Minimal inhibitory concentration (MIC) was determined for each plant extract showing antibacterial activity against test pathogens. Broth dilution method was followed for determination of MIC values. Plant extracts were suspended in acetone to make 10 mg/ml final concentration and serially diluted and added to the respective tubes containing nutrient broth media. Thereafter, 100μl of inoculum (for bacteria 1×10^8 CFU/ml) was added to each tube. The tubes were incubated at 37°C for 24 hrs. The MIC values were taken as the lowest concentration of the extracts in the tube that showed no turbidity after incubation [12].

**Results**

**Isolated bacterial strains**

The identification of isolated bacterial strains was performed on the basis of Colony morphology on different media included as Nutrient agar medium, MacConkey agar medium, EMG agar medium, UTI agar medium, XLD agar medium, BSA agar medium. Gram staining reaction and biochemical analysis were also performed and the results have been shown in table 2, 3.

**Antibacterial activity of antibiotics**

The antibiotic sensitivity test was performed by the Kirby–Bauer Disc Diffusion technique using standard antibiotic discs against the isolated bacterial strains such as Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis and Salmonella typhi. Ciprofloxacin showed the high zone formation against all the isolated bacterial strains. The antibiotic Sensitivity pattern of the isolated bacterial strains was recorded. The results have been shown in table 4.

**Characteristics features of plant extracts**

The plants Solanum nigrum (L.), Murraya koenigii (L.), Sesbania grandiflora (L.) was extracted using acetone. The obtained extracts appeared as green colored semisolid paste form with viscosity. The nature of the plant extracts and the amount of yield have been shown in table 5.

**Preliminary phytochemical analysis**

The results of preliminary phytochemical analysis of acetone extract of Solanum nigrum (L.), Murraya koenigii (L.) and Sesbania grandiflora (L.) showed that the presence and absence of tannins, carbohydrates, alkaloids, flavonoids, saponins, glycosides and amino acids with a slight difference between

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the two seasons. The alkaloids, carbohydrates, tannins and flavonoids are present in all the three plants from the two seasons. Saponins are present only in Solanum nigrum (L.) and Murraya koenigii (L.) in both the seasons and absent in both the seasons of Sesbania grandiflora (L.). Steroids are absent in all the three plants from two seasons. The presence of secondary metabolites by preliminary phytochemical screening was recorded and the results have been shown in table 6.

Residual effects of solvents and DMSO

DMSO and acetone did not show any inhibitory effect against the isolated bacterial strains. So, the inhibitory effect of the solvents such as acetone and DMSO was negligible. The residual effects of solvent and DMSO were recorded and the results have been shown in table 7.

Antibacterial activity of plant extracts

Antibacterial activity of acetone extracts of Solanum nigrum (L.), Murraya koenigii (L.), Sesbania grandiflora (L.) from winter and summer season against the isolated bacterial strains were performed. Murraya koenigii (L.) from winter season showed maximum inhibitory activity for all the isolated urinary tract bacterial strains. In the concentration of 500μg, it showed a maximum zone of inhibition which is 16mm for Escherichia coli; 18mm for Klebsiella pneumoniae; 17 mm for Proteus mirabilis and 15mm for Salmonella typhi. Solanum nigrum (L.) from winter season also possessed 16mm for Salmonella typhi which is more effective than other extracts. The zone of inhibition formed by these plant extracts against the isolated bacterial strains was recorded and the results have been shown in table 8.

Minimal inhibitory concentration (MIC)

The minimal inhibitory concentration values of the acetone extract of these three plants [Solanum nigrum (L.), Murraya koenigii (L.), Sesbania grandiflora (L.)] from two different seasons were observed. The MIC value of Solanum nigrum (L.) from two different seasons for Escherichia coli was 500μg/ml. For Klebsiella pneumoniae, the MIC value was 250μg/ml in the winter season and 500μg/ml in a summer season. For Proteus mirabilis and Salmonella typhi, the MIC value was 250μg/ml in both of the seasons. Murraya koenigii (L.) had a MIC value of 250μg/ml in both the seasons for all the four isolated bacterial strains. Sesbania grandiflora (L.) had a MIC value of 500μg/ml in both seasons for Klebsiella pneumoniae and Proteus mirabilis.

For Escherichia coli, the MIC value was 250μg/ml in winter and 500μg/ml in summer. For Salmonella typhi, the MIC value was 500μg/ml in summer and 250μg/ml in winter. The values were observed and the results have been shown in table 9.

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Discussion

Urinary tract infections affect about 3 percent of children every year. Throughout childhood, the risk of a UTI is 2 percent for boys and 8 percent for girls. Most of the infections are caused by bacteria normally present on the skin or in the intestinal tract that invades the urinary tract [1]. Urinary tract infection occurs more frequently in female than men. This is remaining a major clinical problem over 50 years after the introduction of antimicrobial chemotherapy [13]. From this present study, a total of 52 urine samples were collected. Among them, 48 samples showed the presence of E.coli, K.pneumoniae, P.mirabilis and S.typhi. The similar work with 33 UTI samples from those samples they found UTI caused gram-negative bacteria such as E.coli, K.pneumoniae, P.vulgaris, P.aeruginosa, Enterobacter sp [14].

Table 6: Preliminary Phytochemical Analysis.

| S.No | Constituents / Tests | Solanum nigrum (winter) | Solanum nigrum (summer) | Murraya koenigii (winter) | Murraya koenigii (summer) | Sesbania grandiflora (winter) | Sesbania grandiflora (summer) |
|------|----------------------|--------------------------|--------------------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1    | Alkaloids            | Mayer’s test + + +       | + + +                    | + + +                     | + + +                     |                             |                               |
|      | Drageondorff’s test  | - - -                    | -                        | - - -                     | - - -                     |                             |                               |
|      | Hangers test         | + + -                    | + + +                    | + + +                     | + + +                     |                             |                               |
|      | Wagers test          | - - -                    | -                        | - - -                     | - - -                     |                             |                               |
| 2    | Proteins & Aminoacids| Millon’s test - - -       | -                        | - - -                     | - - -                     |                             |                               |
|      | Ninhydrin test       | + + +                    | + + +                    | ++ +                     | ++ +                     |                             |                               |
|      | Biuret test          | - - -                    | -                        | - - -                     | - - -                     |                             |                               |
| 3    | Anthraquinone glycosides | Borntragers test + + -    | -                        | -                        | -                        |                             |                               |
| 4    | Flavonoids           | Shinoda’s test + + +      | + + +                    | + + +                     | + + +                     | +                           |                               |
|      | Ferric chloride test | + + +                    | + + +                    | + + +                     | + + +                     | +                           |                               |
| 5    | Tannins & Phenols    | Ferric chloride test +++   | +++                     | +++ +                     | +++ +                     | +                           |                               |
|      | Lead acetate test    | +++                     | +++ +                    | + + +                     | + + +                     | +                           |                               |
|      | Gelatin contains NaCl test | +++                     | +++ +                    | + + +                     | + + +                     | +                           |                               |
| 6    | Carbohydrates        | Molisch’s test + + +      | + + +                    | + + +                     | + + +                     | +                           |                               |
|      | Barfoed’s test       | + + +                    | + + +                    | + + +                     | + + +                     | +                           |                               |
|      | Fehling test         | + + +                    | + + +                    | + + +                     | + + +                     | +                           |                               |
| 7    | Saponins             | Frothing test + + +       | + + +                    | + + +                     | + + +                     | +                           |                               |
| 8    | Steroids             | Liebermann-Burchard test - | -                        | -                        | -                        | -                           |                               |

Identification and screening was carried out to detect the presence of bacteria present in the urine sample using the biochemical characterization, motility determination and colony formation on differential culture media like Nutrient agar, MacConkey agar, Eosin Methylen Blue (EMB) agar, Urinary Tract Infection (UTI) agar, Bismuth Sulphite (BSA) agar and Xylose Lysine Deoxycholate Deficient (XLD) agar. Likewise, the similar related work has been identified by Ravikumar S, et al. [15] and isolated the gram negative bacteria like Escherichia coli, Klebsiella pneumoniae and Proteus mirabilis using the biochemical characterization and growth on different selective medium. The same results have been identified Linda...
MD, et al. [1] as most of the gram negative bacteria such as *Escherichia coli*, *Klebsiella pneumonia*, *Proteus* sp, *Enterobacter* sp and *Pseudomonas* sp by using biochemical characterization and different selective medium.

In the present study, Ciprofloxacin showed high inhibitory activity against all the isolated bacteria. Similar work was done by Olerumi et al. [16] observed that the Ciprofloxacin and Ofloxin could inhibit the growth of gram-negative bacteria. The extraction of crude extracts from *Solanum nigrum* (L.), *Murraya koenigii* (L.) and *Sesbania grandiflora* (L.) from two different seasons by acetone was performed to detect the secondary metabolites. The similar work was carried out by Prajakta. J. Patil et al. [17] and they used methanol for crude extraction to detect the presence of secondary metabolites. Another similar work was carried out by Venkatesan et al. [18]. They used ethanol and petroleum benzene for extraction of *Solanum nigrum* (L.) to detect the secondary metabolites.

In the present study, the preliminary phytochemical analysis was performed and the result showed the presence of alkaloids, tannins, phenolic compounds, carbohydrates, amino acids and flavonoids and saponins. Similar work was carried out by Avalaskar et al. [8] as the phytochemical analysis was done by preliminary analysis from the methanolic extract of *Sesbania grandiflora*. It showed that the presence of alkaloids, glycosides, sugars, amino acids and steroids.

Antibacterial activity of acetone extracts of *Solanum nigrum* (L.), *Murraya koenigii* (L.) and *Sesbania grandiflora* (L.) from two different seasons against isolated strains was done by using disc diffusion method. From that study, acetone extract of *Murraya koenigii* (L.) from winter season showed high activity (*E.coli* 16mm, *K.pneumoniae* 17mm, *P.mirabilis* 15mm, *S. typhi* 16mm) than other extracts against all organisms. Similar work was carried out by Abishek mathur et al. [19]. From their study, they reported that *Murraya koenigii* (L.) showed high inhibitory activity against *E.coli* and *K.pneumoniae* which is 26 and 22 mm respectively. Another work was performed in *Ocimum bacillicum*.

### Table 9: Minimal Inhibitory Concentration (MIC) of Acetone extract of Edible plants against from different seasons against isolated bacterial strains.

| Plant Extracts       | MIC for Escherichia coli (µg/ml) | MIC for Klebsiella pneumoniae (µg/ml) | MIC for Proteus mirabilis (µg/ml) | MIC for Salmonella typhi (µg/ml) |
|----------------------|----------------------------------|--------------------------------------|----------------------------------|----------------------------------|
|                      | 1.95  | 3.90  | 7.81  | 15.6  | 31.2  | 62.5  | 125   | 250   | 500   | 1000 |
| *Solanum nigrum* (w) | +     | +     | +     | +     | +     | +     | +     | β     | -     | -    |
| *Solanum nigrum* (s) | +     | +     | +     | +     | +     | +     | -     | +     | β     | -    |
| *Murraya koenigii* (w) | +     | +     | +     | +     | +     | +     | +     | +     | β     | -    |
| *Murraya koenigii* (s) | +     | +     | +     | +     | +     | +     | +     | +     | β     | -    |
| *Sesbania grandiflora* (w) | +     | +     | +     | +     | +     | +     | +     | +     | β     | -    |
| *Sesbania grandiflora* (s) | +     | +     | +     | +     | +     | +     | +     | +     | β     | -    |

**Note:** + = Growth. - = No Growth. β =MIC value

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L. by M. B. Outarra, et al. [20]. In their study, they reported that the Ocimum basilicum (L.) showed a high zone of inhibition against E.coli, P.mirabilis and S.typhi which is 24, 27and 21 respectively.

In the present study, the minimal inhibitory concentration was observed against the bacterial isolates. The extracts showed a good activity against all the isolated bacterial strains. Murraya koenigii (L.) showed 250μg/ml in both the seasons for all strains which is more effective than all other strains. Similar work was carried out by Usman H, et al. [5]. They observed MIC of Tribulus terrestris (L.) extract against Escherichia coli which was 1.250mg/ml.

The plants, Solanum nigrum (L.), Murraya koenigii (L.), Sesbania grandiflora (L.) have been involved in our investigation which acts as a nonantibiotic alternative for preventing urinary tract infection. Meanwhile, all the three edible plants are effective in winter season than the summer season. The difference in the antibacterial activity between the two seasons is due to the variation in a number of secondary metabolites present in the plants. Using these edible plants leads to reducing the amount of antibiotics prescribed for the treatment of UTI and preventing drug resistance. This study demonstrated that the extracts from the leaves of Solanum nigrum (L.), Murraya koenigii (L.), Sesbania grandiflora (L.) act as a modern medicine for UTI bacteria. The advanced pharmacological screening of these edible plants using the modern tool may lead to some new drug.

Conclusion

The present research study suggested that the acetone extracts of the selected edible plants possess the broad spectrum antibacterial activity against the isolated urinary tract infection causing bacterial strains. This study revealed that the edible plant sources can also be effective as the modern medicine to inhibit the growth of pathogenic urinary tract bacteria and devastating the antibiotic resistance. Further studies should be needed with these edible plants for the structural elucidation of bioactive compounds to formulate a new drug to treat the urinary tract infections.

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References

1. Linda MD, Shortliffe D (2002) Host pathogenesis in urinary tract infection. Int J Antimicrob Agents 17: 245-251.
2. Meyhoff H, Nordling J, Gammelgaard P, Vejjsgaard R (1981) Does antibacterial ointment applied to urethral meatus in women prevent cystitis. Scand J Urol Nephrol 15: 81-83. Link: https://goo.gl/WiwvUn
3. Hasan Ejaz, Aizza Zafar, Anwar N, Cheema TA, Humaera Shehzad (2006) Prevalence of bacteria in Urinary tract infection among children Biomed 1: 22.
4. Sree Bhushan R, Tiwari B (2001) Identification and characterization of UTI pathogens J Bacteriol 107: 718-735.
5. Usman H, Abdul FL, Landon AA (2007) Phytochemical and antimicrobial evaluation of Tribulus terrestris L.(Zygophyllaceae) growing in Nigeria Bio 2: 244-247. Link: https://goo.gl/FStlLx
6. Atanu FO, Ebiloma1 UF, Ajayi EI (2010) A review of the pharmacological aspects of Solanum nigrum Linn. Biotech Molecular bio Rev 6: 1-7. Link: https://goo.gl/3q0sup
7. www.wikipedia.org/wiki/Murraya koenigii /Solanum nigrum/Sesbania grandiflora.
8. Avalaskar AN, Itankar PR, Joshi VS, Agrawal M, Vyas J (2011) Phytochemical and TLC Studies of ethanolic extract of Sesbania grandiflora. Int J Pharm Res 3: 1346-1349. Link: https://goo.gl/BQqeCy
9. Arun Thangavel, Senthilkumar Balakrishnan, Azhar Ahmad, Sambbag Duraisamy, Suresh Kumar Muthusamy (2014) Phytochemical screening, gas chromatography-mass spectrometry (GC-MS) analysis of phytochemical constituents and anti-bacterial activity of Aerva lanata (L.) leaves Afr J Pharm Pharmacol 8: 126-135. Link: https://goo.gl/5YQSHL
10. Arun T, Senthilkumar B, Purushothaman K, Aarthi A (2012) GC-MS determination of bioactive components of Phyllanthus amarus (L.) and its antibacterial activity J Pharm Res 5: 4767-4771. Link: https://goo.gl/k4a17p
11. Saranya MS, Arun T, Jayaporn P (2012) Invito antibacterial activity and preliminary phytochemical analysis of leaf extracts of Agrume Mexicana Linn–A medicinal plant Int J Jurr Pharm Res 4: 85-87. Link: https://goo.gl/hyVw4v
12. Sharma B, Kumar P (2009) Extraction and Pharmacological Evaluation of Some Extracts of Tridax procumbans and Capparis decidua. Int J Adv Res in Nat prof 1: 5-12. Link: https://goo.gl/2HlpEs
13. Mohammad R, Kambiz Diba (2013) Invito activity of cranberry extract against etiological agents of Urinary tract infection. Afr J Pharm Pharmacol 4: 286-288. Link: https://goo.gl/aipat67
14. Anjana S, Rani V, Padmini R (2009) Antibacterial Activity of Some Medicinal Plants Used by Tribals Against Uti Causing Pathogens World Appl sci J 7: 332-339. Link: https://goo.gl/vSlnB6
15. Ravisikumar S, Gnanadesigan M, Suganthi P, Ramalakshmi A (2006) Antibacterial potential of chosen mangrove plants against isolated urinary tract infectious bacterial pathogens Int J Med Sci 2: 94-99. Link: https://goo.gl/t4qyir
16. Oluremi BB, Idowo AO, Olanjiy JF (2011) Antibiotic susceptibility of common bacterial pathogens in urinary tract infections in a Teaching Hospital in Southwestern Nigeria Afr J Microbiol Res 5: 3658-3663. Link: https://goo.gl/Sa7aaH
17. Prajakta J, Patil, Jai S Gosh (2010) Antimicrobial activity of Catharanthus roseus – A detailed study Bri J Pharmacol and Toxicol 1: 40-44. Link: https://goo.gl/wWbJhr
18. Venkatesan D, Karunakar K, Kumar SS (2009) Studies on Phytochemical constituents, functional group identification and antimicrobial activity of Solanum nigrum (Solanaceae) Ethnotob Leaflets 13: 1485-1503. Link: https://goo.gl/umD04E
19. Abhishek M, Dua VK, Prasad KS (2010) Antimicrobial Activity of Leaf Extracts of Murraya koenigii against Aerobic Bacteria Associated with Bovine Mastitis Int J Chem Environ Pharm Res 1: 12-16. Link: https://goo.gl/QOfzn2
20. Ouattara MB, Konate KM, Kiendrebeogo, Ouattara N, Compaore M, et al. (2011) Antibacterial Potential and Antioxidant Activity of Polyphenols of Sesbania grandiflora Curr Res J Bio Sci 3: 351-356. Link: https://goo.gl/idzb39