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Research Article

STUDY ON ANTIBACTERIAL ACTIVITY OF MEDICINAL HERBS AGAINST URINARY TRACT INFECTION (UTI) PATHOGENS

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ABSTRACT

This study is aimed in the direction of the dedication of antimicrobials on native herbals in Tirunelveli district. Tamil Nadu. India. In the direction of fine pathogenic microorganisms isolated from the urinary tract of humans. The urine pattern was gathered from patients who have been processed for the isolation & identity of pathogenic bacteria. The extracts have been subjected for screening of in vitro antibacterial activity against decided primary urinary tract contamination (UTI) causing pathogens viz. (*Staphylococcus aureus, Klebsiella pneumonia, Salmonalla typhi, Escherichia coli,* and *Streptococcus pyogenes*) at the concentrations of 25 µl to 200 µl via disc diffusion assay technique. The effects of antibacterial activity discovered that the all extract confirmed suitable inhibitory interest against all the tested pathogens. The leaves of herbs, specifically *Azadirachta indica, Ocimum sanctum,* and *Phyllanthus niruri* were taken and an ethanol extract changed into prepared.

Keywords: *Azardirachta indica, Ocimum sanctum, Phyllanthus niruri, Staphylococcus aureus.*

INTRODUCTION

Currently, antibiotic resistance is a significant global health issue. The rapid emergence and spread of multidrug-resistant bacteria endangers our ability to effectively treat prevalent infectious diseases. One of the main causes of drug resistance is thought to be the indiscriminate use of commercial antibiotics. According to the World Health Organization (WHO), drug-resistant diseases could result in 10 million deaths annually by 2050 and severely affect the global economy (International Health Organization, 2020). For that reason, it's very vital to perceive produce with antimicrobial families that would be applied to broaden novel and efficient antibiotics. Flowers had been used due to historical times to deal with diseases and the practice is sustained until nowadays. Its miles predicted that approximately 80% of the population from growing countries makes use of drugs derived from plant species. As plant-derived drug treatments are more secure than synthetic options (Nisar *et al*., 2018)

Antibacterial interest of a few Medicinal plant life used against urinary tract infections (UTI) inflicting Pathogens (Amith Kumar *et al*., 2012). Evaluated the antimicrobial pastime of various concentrations of *Ocimum sanctum* (Tulsi) extract in opposition to *Streptococcus mutans* in an in vitro look at (Kebira *et al*., 2009) stated the isolation and antimicrobial susceptibility trying out of *Escherichia coli* inflicting urinary tract infections (Aiyegoro *et al.,* 2007) evaluated the pathogens of urinary tract infections amongst youngsters and adolescents. In a test on flowers that have historically been used in Nepal to cure illnesses that might be caused by viruses. Three mammalian viruses have been quantitatively evaluated for amusement in twenty-one methanol extracts from twenty different animals: Herpes simplex virus, Sindbis virus, and poliovirus. In addition to dark conditions and cytotoxicity, assays have been conducted in ultraviolet (UV)-A or have been hardly visible. Bauhinia (*Fabaceae*), Carissa (*Apocynaceae*), Mallotus (*Fabaceae*), Rumex (*Polygoneceae*), Streblus (*Moraceae*), Terminalia (*Combtretaceae*), and Tridax species are all included. Displayed mind-blowing antiviral abilities (*Adteraceae*). The Carissa extract changed into the most lively, showing interest toward all 3 viruses at an awareness of 12 micrograms ml. some of the alternative

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extracts confirmed partial inactivation of 1 or greater check viruses (Tailor *et al*.,1996).

But after the Portuguese, British, and French colonists arrived in the Indian subcontinent a few hundred years ago, traditional practises like using Neem leaves to protect plants and stored grains started to be stigmatised as being archaic and backward. As a result, these environmentally friendly practises were abandoned in favour of modern chemical products imported from the west. Slowly but surely, the knowledge and skills that humans had accumulated over centuries due to the trials and errors of previous generations came under assault (Gahukar, 1995). Within the indigenous gadget of medication, turmeric, *Curcuma longa*, enjoys the recognition as a blood cleaner, is utilized in not unusual cold, leprosy, afflictions of liver, Purulent Ophthalmia, indolent ulcers, pyogenic infections, wound restoration and infection. Exclusive extracts of a nearby weed, *Eupatrium adinophorum* were examined for its impact on species of *Rhizobium*, *Brady rhizobium*, *Azotobacter* and *Pseudomonas* was found to have various tiers of antimicrobial activity ranging from negligible effect on *Azotobacter* and *Pseudomonas* species to a high anti-microbial effect on *Brady rhizobium* species (Bloor, 1994).

Azadirachta indica's combination of medical and agricultural benefits made it a favourite companion of Indians travelling to far-off regions in search of their fortunes in the past, which contributed to its widespread dispersion and multiplication throughout the continents. The *Azadirachta indica* tree provided comfort and served as a bridge between Indians living abroad and their country of origin. It represented a typical way of life and satisfied the desire to live in close harmony with the natural world. Because of this, the *Azardirachta indica* tree is found in many places in the Americas and the Caribbean, including Fiji, Australia, East and Sub-Saharan Africa, South East Asia, and Australia. The tale of the remote corners of the world continues with this oceanic expedition (Tewari, 1992). All elements of a common shrub of southern India, *Solanum tribatum* are located to be beneficial in treating bronchial asthma, continual febrile infections and urinary tract infections and many others. Iscardor, an education from the *Viscum album*, produced cytotoxicity in diverse cellular lines (Giru *et al.,* 1990).

MATERIALS AND METHODS

Collection of urine sample

In Tamil Nadu's Tirunelveli district hospitals, 50 urine samples were gathered. Boric acid was added right away, at a final bacteriostatic concentration of 1.8%, to the samples imported from India in sterile plastic universal containers and transferred to the laboratory in a very cold environment (Porter *et al*., 1969 and Maskell *et al*., 1982)

Isolation and identification of bacteria from urine samples

Loopfuls of urine samples were streaked on (Cystine lactose electrolyte deficient medium) and MacConkey agar medium for the isolation of UTI-causing organisms, and they were then incubated at 37°C for Antibacterial activity of plant extracts: Susceptibility 24 hours (Inabo *et al*., 2006). With the use of Bergey's Manual of Systematic Bacteriology, the PIB computer kit, and Hinton Agar, colonies were chosen and characterised after incubation based on morphological, cultural, and biochemical traits (MacFaddin 1980; Bryant, 1993).

Plant material

A total of 3 plants and their parts viz. Neem (*Azardirachta indica*), Tulsi (*Ocimum sanctum*) and Keezhanelli (*Phyllanthus niruri*) were collected based on ethnomedical importance and information provided by local medicine men of tribal region of Tirunelveli district (T.N.), India. All specimens were identified by S. Peer Mohamed, Assistant Professor, Department of Zoology, Sadakathullah Appa College, Tirunelveli district, Tamil Nadu, India prior to their use.

Extraction of plant material

Plant materials were cleaned with distilled water, dried in the shade, ground to a fine powder, and kept at room temperature and in the dark until needed (Tetyana *et al*., 2002). The powdered samples were extracted using several organic solvents (Acetone, Ethanol), together with water, according to the procedure (Nair *et al*., 2005).

Antibacterial activity of plant extracts

The disc diffusion experiment was used to determine if UTI isolates were susceptible to the extracts (Rios *et al*., 1998). 24 hour solid bacterial culture was seeded into petriplates with Mueller Hinton Agar media. By comparing the inoculum size to 0.5 Nephlometer standards, the final concentration was adjusted to 10 cfu/ml. Whatman filter paper discs (5mm in diameter) coated with plant extract (40 mg/0.1ml) were placed on the surface of culture plates, incubated at 37°C for 24 hours, and the diameter of the zone of inhibition were measured in mm. Control discs included acetone, ethanol, and autoclaved distilled water.

Table 1. Urine sample of patient's.

Total number of samples	Number of positive samples	Percentage of positive samples
50	21	42%

Table 2.List of urinary tract infection pathogens.

Name of the organism	Number of cases
Escherichia coli	8
Klebseilla pneumoniae	7
Staphylococcus aureus	4
Salmonella typhi	1
Streptococcus pyogenes	1

Table 3.Antibacterial activity of Neem (*Azadirachta indica*) leaf extract.

Pathogens	Extract concentration -µl				
	25µl	50µl	100µl	100µl	200µl
Staphylococcus aureus	-	13mm	15mm	17mm	22mm
Klebseilla pneumoniae	-	-	17mm	20mm	21mm
Salmonella typhi	-	-	24mm	24mm	26mm
Escherichia coli	-	-	23mm	24mm	24mm
Streptococcus pyogenes	-	20mm	24mm	25mm	27mm

Table 4.Antibacterial activity of Tulsi (*Ocimum sanctum)* leaf extract.

Pathogens	Extract concentration - µl				
	25µl	50µl	100µl	150µl	200µl
Staphylococcus aureus	-	10mm	12mm	12mm	14mm
Klebseilla pneumoniae	-	-	-	-	1mm
Salmonella typhi	-	-	7mm	9mm	11mm
Escherichia coli	-	-	11mm	-	1mm
Streptococcus pyogenes	-	-	-	-	12mm

Table 5.Antibacterial activity of Keezhanelli (*Phyllanthus niruri*) leaf extract.

Pathogens	Extract concentration -µl				
	25µl	50µl	100µl	150µl	200µl
Staphylococcus aureus	-	-	10mm	12mm	13mm
Klebseilla pnemoniae	-	-	8mm	9mm	12mm
Salmonella typhi	-	7mm	8mm	11mm	14mm
Escherichia coli	-	-	6mm	7mm	9mm
Streptococcus pyogenes	-	-	7mm	9mm	11mm

Graph 1.The chart shows the urine sample of patient's.

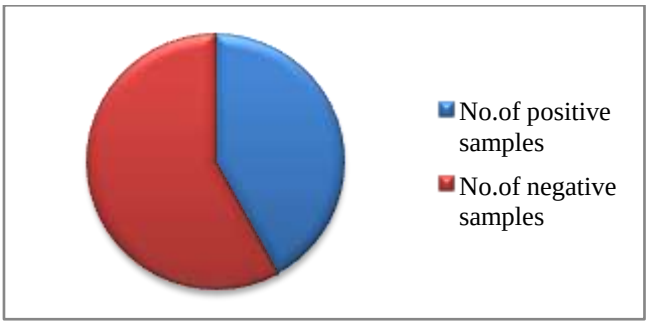
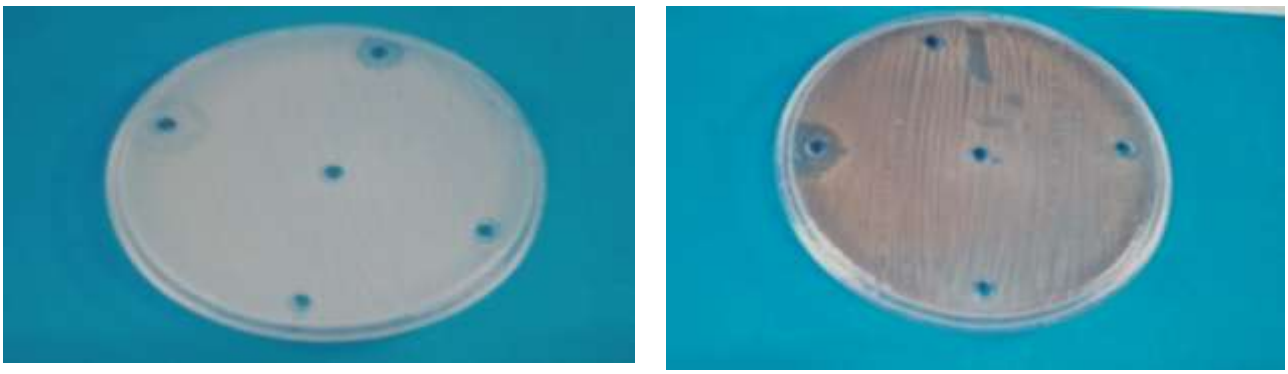


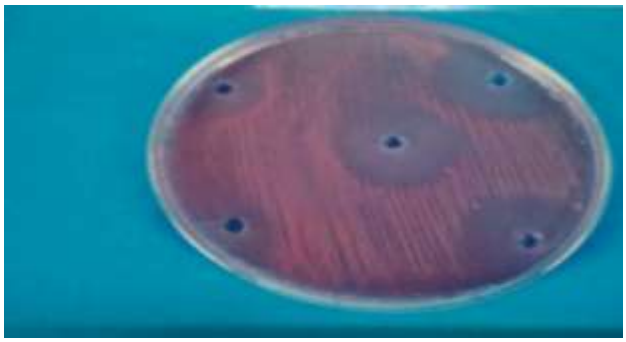
Figure 1. Fifty urine samples were collected from various hospitals in Tirunelveli district, Tamil Nadu. India.

A.Neem (*Azardirachta indica*) B. Tulsi (*Ocimum sanctum*) C.Keezhanelli (*Phyllanthus niruri*)

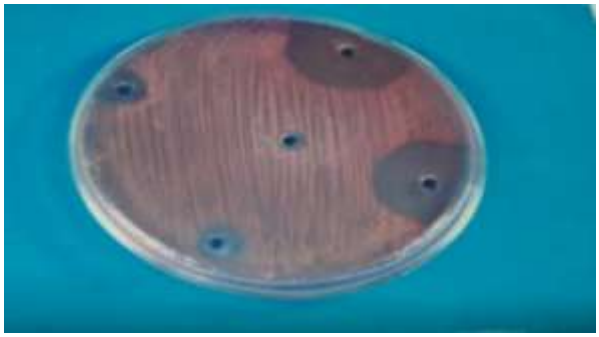
Figure 2.Three medicinal herbs were collected from Tirunelveli district, Tamil Nadu. India.



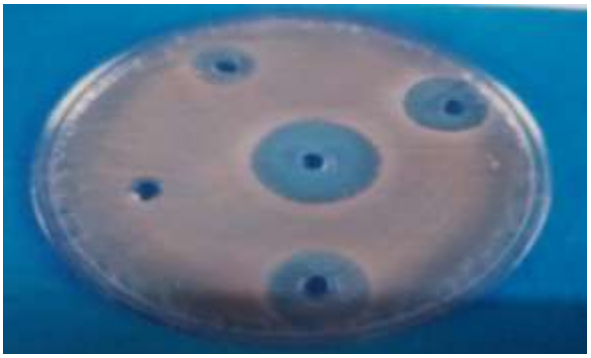
Test 1. *Staphylococcus aureus* Test 2. *Salmonella typhi*



Test 3. *Salmonella typhi*



Test 4. *Escherichia coli*



Test 5. *Klebseilla pneumoniae*

Figure 3. Test microorganism.

RESULTS AND DISCUSSION

Urine samples of the patient's total number of samples: 50, number of positive samples: 21 and percentage of positive samples: 42% were recorded in hospitals in and around Tirunelveli district. Tamil Nadu. India. (Table 1 and Figure 1 and Graph 1).The observe pathogens (*Staphylococcus aureus, Klebsiella pneumonia, Salmonalla typhi, Escherichia coli, and Streptococcus pyogenes*) were identified by the specific biochemical reactions (Table 2) and Figure 2(A.B and C) shows that three medicinal herbs were collected from Tirunelveli district, Tamil Nadu. India. In our experiments using *Azadirachta indica leaf* extracts 50-200 µl concentration of the extract to be effective against all pathogens at high concentrations. The ethanolic extracts of *Ocimum sanctum leaves* was effective against *Staphylococcus aureus, Salmonella typhi and Escherichia coli* at a concentration of 100µl *Klebseilla pneumoniae* and *Escherichia coli* was completely fulfilled at a concentration of 200 µl. The results for antimicrobial screening as measured by diameters of zones of inhibition are shown in (Table 3, 4, 5 and Figure 3(Test1 to Test 5). *Phyllanthus niruri* was found to be active against all pathogens at a concentration of 100 µl & 200 µl but their effect was minor in *Streptococcus pyogenes*. On comparing the inhibitory effect of each leaf extracts on the individual pathogens (Table 5). The antibacterial activity of aqueous, ethanol, and acetone extracts against sixty-six multidrug resistant isolates of the main urinary tract pathogens (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Enterococcus faecalis*) has been examined in seventeen Indian folklore medicinal plants. *Zingiber officinale* and *Punica granatum* ethanol extract both shown significant antibacterial action against *Escherichia coli*. *Terminalia chebula* and *Ocimum sanctum* ethanol extracts showed antibacterial activity against *Klebsiella pneumoniae*. While ethanol extracts of *Azadirachta indica* and *Ocimum sanctum* showed antibacterial action against *Enterococcus faecalis* and *Cinna momum cassia* showed greatest antibacterial activity against *Pseudomonas aeruginosa*, respectively. The consequences guide the folkloric use of those plants within the remedy of urinary tract infections by means of the tribals of Mahakoshal vicinity of significant India (Anjana Sharma *et al*., 2009). There have been numerous studies on the antibacterial, antifungal, and anti-inflammatory activities of medicinal flora (Samy Ignacimuthu, 2000). Plant phytochemicals can interact with soluble and extracellular proteins to damage microbial membranes. A variety of phytochemicals have been discovered via numerous studies from Pakistan and other nations that have been scientifically shown to be useful against a particular disease. The majority of these phytochemicals were discovered through the historical use of medicinal flowers to treat a specific condition (Akharaiyi Fred Coolborn and Boboye Bolatito, 2010).

Since those ancient times, flora has continued to play a significant part in the maintenance of human health as a source of medicinal substances. According to the sector health corporation, 80% of the market's pharmaceuticals come from herbal products, and plant extracts or their energetic components are used as folk medicine in conventional therapies (Kirbag *et al*., 2009). Many phytochemicals' precise roles are still unknown, but a large number of studies have demonstrated that they are involved in the interactions between diseases, pests, and flowers. Phytochemical and plant extract antimicrobial screening is thus a starting point for the development of antimicrobial drugs. Plant scientists have become interested in phytochemical investigations as a result of the creation of cutting-edge, challenging procedures. These techniques played a significant role in the quest for additional sources of raw materials for the pharmaceutical industry (Ryan *et al*., 2004).

CONCLUSION

The leaves of herbs, specifically *Azadirachta indica*, *Ocimum sanctum*, and *Phyllanthus niruri* for antibacterial effect of leaf extracts at various attentions modified into decided through complete plate technique of those 3 herbs. *Azadirachta indica* (Neem) have decided to be powerful towards all of the pathogens. This has a look at can be very useful in scientific discipline to kill the urinary tract contamination pathogens very effectively even as compared to business antibiotics. The medicinal plant extract is very reasonably-priced and high-quality and does not cause health risks and is really useful to the patient to get over urinary tract contamination. This studies the manner for destiny researchers to carry out the pathway in this area to discover the superior medicinal flora with extra therapeutic value. Wide-ranging medical benefits of medicinal flora are used to treat and prevent a variety of diseases. In pastoralist groups who are harmed by modern hospital care, those plant lives are utilised for primary healthcare. They have enormous bioactive treatments in addition to different chemical architectures. Medical research on the effectiveness and safety of plants used to treat urinary tract infections hasn't been completely utilised, though. This investigation's goals were to evaluate antibacterial hobbies and screen phytochemicals from medicinal flora used to treat urethral infections. Extracted samples showed strong antibacterial activity. Therefore, further structural elucidation of the bioactive compounds that slowed the development of the microorganisms described in the flora can be employed as a starting point for the synthesis of novel antibiotics in the future.

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