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Research Article

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Antimicrobial activity of medicinally important plant-*Tephrosia purpurea* Linn. against pathogenic bacteria

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ABSTRACT

Plants have been a valuable source of natural products for maintaining human health. Plants are used in traditional medicinal systems have proved to be reliable sources of antimicrobial compounds. Medicinal plants have been considered interesting since they are frequently used in medicine as remedies for many infectious diseases. The plant Tephrosia purpurea has been used in different system of traditional medication for the treatment of diseases and ailments of human beings. It is reported to contain various flavonoides, alkaloids, steroids, phenolic compounds. It has been reported as anticancer, antioxidant, anti-inflammatory, antiulcer, hepatoprotective, immunomodulatory, antilithiatic, free radical scavenging, antileishmanial, antibiotic, antimicrobial, anyihyperglycemic, antilipidperoxidative and wound healing activities. The whole plant and its roots are used for medicinal purposes. The herb is useful both, internally as well as externally. In this study ethanol and acetone leaf & root extract of Tephrosia purpurea were investigated for in vitro antibacterial property by agar disc diffusion method. The crude extract of Tephrosia purpurea, the acetone and ethanol root extract showed good antimicrobial activity against the Salmonella typhi & Proteus mirabilis. Leaf extract of ethanol showed good antimicrobial activity against the Proteus mirabilis. Leaf extract of acetone showed moderate inhibition activity against the Staphylococcus aureus.

Key words: Antibacterial, *Staphylococcus aureus, Tephrosia purpurea,*

INTRODUCTION

From ancient times plants have provided a source of inspiration for novel drug compounds, as plant derived medicines have made large contributions to human health and well being (1&2). With the rising prevalence of microorganisms developing resistance to antibiotics, there is an urgency to develop new antimicrobial compounds. Being nontoxic and easily affordable, there has been resurgence in the consumption and demand for medicinal plants (3)**.** Though many Indian medicinal plants are used in various Indian systems of medicine like Ayurveda, Siddha, Unani and Homeopathy, Still almost over half of the Indian medicinal plants are not exploited fully for the therapeutic activity or pharmaceutical aid. *Tephrosia purpurea* belongs to the family Fabaceae. English name is purple *Tephrosia*, vernacular name is Kolangi. It is a perennial herb found throughout the Indian subcontinent. The plant is 30-50cm height. Leaves are bipinnate, the flowers are pink and the effective parts were used as medicines are leaves, stems and roots. The aerial parts of *Tephrosia purpurea* were used to treat pathological conditions like hydrophobia, asthma, cough, heart, lung diseases, kidney problems, mouth ulcer and piles. *Tephrosia purpurea* is a medicinal plant, considered highly useful in bilious febrile attacks and obstruction of liver and spleen (4). According to Ayurveda literature, this plant has the property of healing all types of wounds. It is an important component of

some preparation such as Tephroli and Yakrifit used for liver disorders (5, 6 & 7). The *Tephrosia purpurea* leaves are reported to be useful in jaundice (8). *Tephrosia purpurea* has been shown to possess antimicrobial activity (9), insecticidal and repellent activity (10), antilithiatic activity (11),antihyperglycemic and anti lipid peroxidative effect (12). The plant was found to contain rutin, quercetin, lupeol, retinoid mainly degulin, elliptone, rotenone and tephrosin (13 &14). *Tephrosia purpurea* is a common weed found in all parts of india and has been used as green manure in paddy cultivation. In the present study to determine the antimicrobial activity of the aerial parts of Tephrosia *purpurea* on different pathogenic bacteria by using two different solvent extract.

EXPERIMENTAL SECTION

Plant material

Leaves and Roots of *Tephrosia purpurea* were collected from fields near Kolli Hills, Namakkal Dt, Tamil Nadu, India.

Preparation of plant extracts

The solvent extractions like ethanol and acetone extract of *Tephrosia purpurea* leaves and roots were prepared according to the method of (15). 4Kgs of *Tephrosia purpurea* leaves & roots were dried, powdered and then soaked in 500 ml of ethanol and acetone by using Soxhelt extractor for 48 hrs at a temperature not exceeding the boiling point of the solvent. All Solvent extracts was evaporated by the process of Distillation procedure for recovery of solvent. The residues obtained were stored in a freezer -80º C until further tests (16).

Test organisms used for the study

They were tested against four bacterial strains three gram negative bacterium *Salmonella typhi, Proteus mirabilis & Escherichia coli* and gram positive bacterium *Staphylococcus aureus*.

Muller Hinton agar medium was prepared by using clean sterile conical flask and kept it for sterilization. After sterilization the medium was poured into the sterile Petri plates and allowed to solidify. The bacterial culture was inoculated in the peptone water and kept in the shaker for **7**-8 hours. Then the culture was swabbed on the surface of the Muller Hinton Agar medium by using sterile cotton swabs. The sample was added into the sterile disc, which kept on hot plate different concentrations (75µl, 100µl, 125µl and 150µl) by using sterile tips. Then the plates were incubated into the incubator for 24 hours at 37ºC. The zones of inhibition of the tested microorganism by the extracts were measured using a Fisher-cilly antibiotic zone reader model 290(U.S.A) The zone of inhibition were measured.

RESULTS

The ethanol and acetone extracts were selected for antimicrobial activity and tested against Gram- positive and Gram- negative microorganisms *Staphylococcus aureus, Salmonella typhi, Proteus mirabilis and Escherichia coli*. The results revealed that the extracts showed moderate to high antimicrobial activity against all the tested microbial strains. The antimicrobial activity was evaluated from the zone of inhibition (Table-1&2). Among the two crude extract of *Tephrosia purpurea*, the acetone and ethanol root extract showed good antimicrobial activity against the *Salmonella typhi* & *Proteus mirabilis*. Leaf extract of ethanol showed good antimicrobial activity against the *Proteus mirabilis.* Leaf extract of acetone showed moderate inhibition activity against the *Staphylococcus aureus*. The root extract of *Tephrosia purpurea* have a good antimicrobial activity compare to the leaf extract of *Tephrosia purpurea.*

Table 1: Effect of Ethanol and Acetone leaf extract of *Tephrosia Purpurea* against pathogenic microorganisms

S/No	Micro organisms	Zone of Inhibition (mm)							
		Ethanol extract(µl)				Acetone extract(µl)			
		75	100	125	150	75	100	125	150
1	*Escherichia coli,*	10	11	11	12	10	11	12	12
2	*Salmonella typhi*	11	12	13	14	11	13	15	16
3	*Proteus mirabilis*	10	14	17	19	12	14	16	18
4	*Staphylococcus aureaus*	11	13	14	15	12	13	14	16

Fig 1: Effect of Ethanol and Acetone leaf extract of *Tephrosia Purpurea* against pathogenic microorganisms

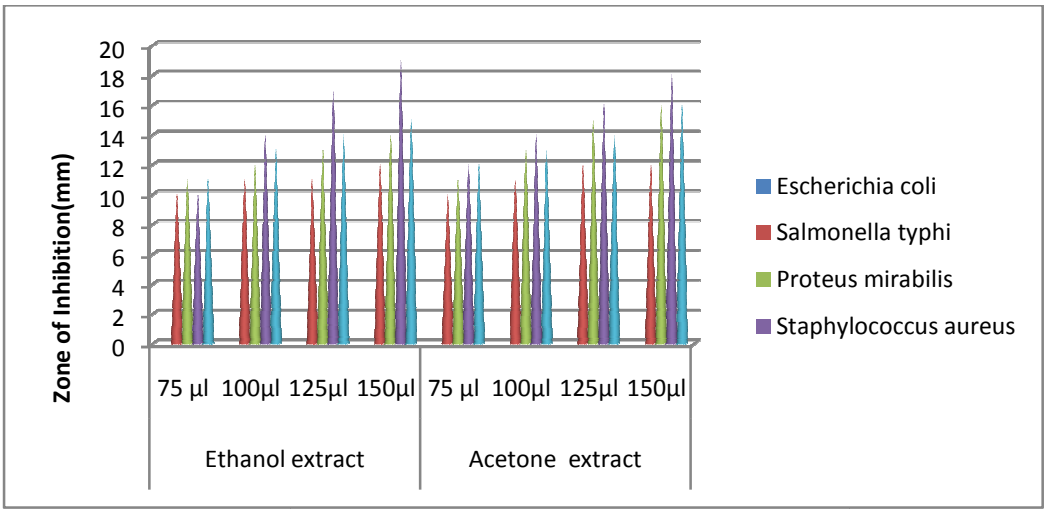
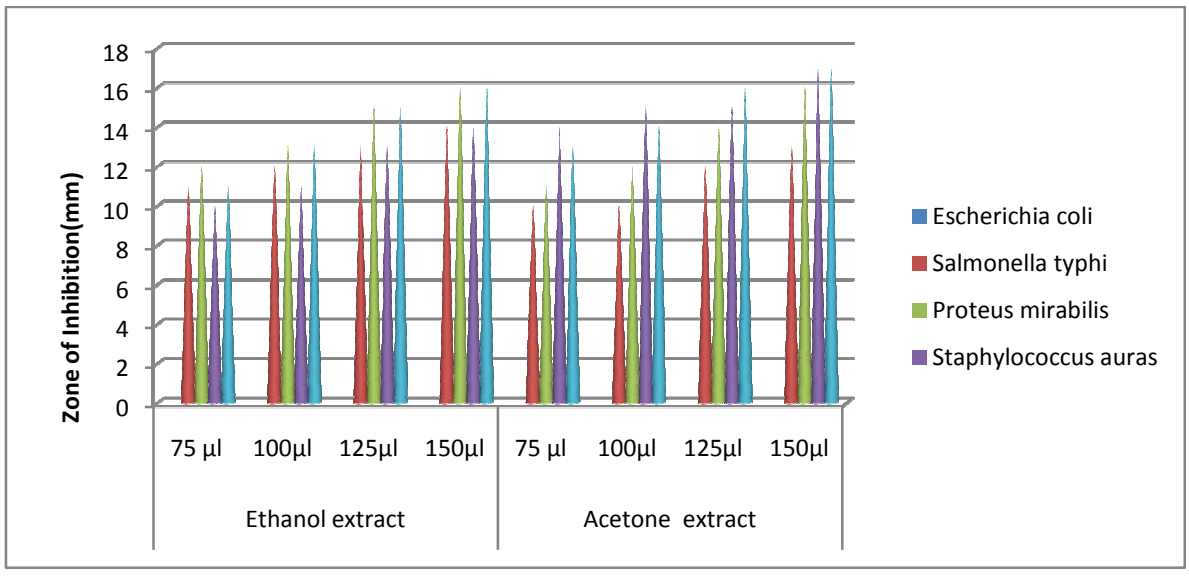


Table 2: Effect of Ethanol and Acetone root extract of *Tephrosia Purpurea* against pathogenic microorganisms

S/No	Micro organisms	Zone of Inhibition (mm)							
		Ethanol extract(µl)				Acetone extract(µl)			
		75	100	125	150	75	100	125	150
1	*Escherichia coli,*	11	12	13	14	10	10	12	13
2	*Salmonella typhi*	12	13	15	16	11	12	14	16
3	*Proteus mirabilis*	10	11	13	14	14	15	15	17
4	*Staphylococcus auras*	11	13	15	16	13	14	16	17

Fig 2: Effect of Ethanol and Acetone root extract of *Tephrosia Purpurea* against pathogenic microorganisms



DISCUSSION

Several workers have been reported that many plants possess antimicrobial properties including the parts which include; flower, bark, stem, leaf, etc. It has been shown that when solvents like ethanol, hexane and methanol are used to extract plants, most of them are able to exhibit inhibitory effect on both gram positive and gram negative

bacteria (17). In the present study also the Acetone and Ethanol extracts of *Tephrosia Purpurea* showed zone of inhibition against the pathogens with varied diameter. This work also showed that all the leaves and root extracts were possessed antimicrobial activity and they can be used as broad spectrum antibiotics since they were active against both Gram positive and Gram negative bacteria. Antibacterial effects of these plants on *Staphylococcus aureus, Salmonella typhi, Proteus mirabilis and Escherichia coli* showed that the plants can be used in the treatment of varies diseases in man also (18). The acetone extracts of *Eupatorium glandulosum* showed higher antibacterial activity against *Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa* and *Streptococcus pyogens* (19). Similarly in the present study also, Ethanol and Acetone root extract showed good antimicrobial activity against the *Salmonella typhi* & *Proteus mirabilis*. It is hoped that this study would lead to the establishment of some compounds that could be used to formulate new and more potent antimicrobial drugs of natural origin. The susceptibility of various microbial agents to different extract of *Tephrosia Purpurea* indicates that plant is the potential source for antimicrobial compound. So further work on the profile in order to determine the nature of bioactive principles present in the plant and their mode of action.

CONCLUSION

The results of this study have shown that the root extracts of *Tephrosia purpurea* (Kolangi) have great potential as antimicrobial agents in the treatment of infectious organisms. Further detailed investigation of the active components of the plant for the exact mechanism of action will contribute greatly to the development new pharmaceuticals.

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