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Phytochemical Investigation and Antibacterial Assay of Some Important Medicinal Plants

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Abstract

A Survey On Human Bacterial Pathogens, *Klebsiella Pneumoniae, Staphylococcus Aureus, Salmonella Typhi, Proteus Vulgaris* And *Pseudomonas Aeruginosa* Has Studied The Antibiotic Properties Of Two Medicinally Significant Plants, *Lagerstroemia Indica* And *Annona Reticulata* Leaf Extracts. The Disc Diffusion Technique Was Used To Conduct Antibacterial Trials Using Methanol And Aqueous Extracts Against Microorganisms. The Results Of The Current Investigation Showed The Presence Of A Broad Range Of Antibacterial Activity Against All The Bacterial Pathogens Tested. The Highest Inhibitory Zone Detected By Methanol Extract Versus Aqueous Extract Was As Follows For Each Bacterium. All Of Them Were Found: *S. Typhi* (12 Mm), *S. Pneumoniae* (13 Mm), *S. Vulgaris* (20 Mm), *S. Pneumoniae* (12 Mm) And *S. Aureus* (12mm). The Current Investigation Reveals That The Medicinal Herbs Chosen Have Antibacterial Activities For *K. Pneumoniae, S. Aureus, S. Typhi, P. Vulgaris* And *P. Aeruginosa* Infections. Phytochemical Screening Identified A Variety Of Substances Including Terpenoids, Tannins, Deoxy Sugar, Saponins, Phenolic Compounds And Flavonoids, Which May Contribute To The Antibacterial Action Of The Above-Mentioned Medicinal Plants.

Keywords: Antibacterial, Phytochemistry, Human Pathogens, *Lagerstroemia Indica, Annona Reticulata*.

Introduction

Medicinal Herbs Are The Rich Source Of Antibacterial Compounds. Plants Are Utilised Medically And Are A Source Of Many Effective And Strong Medications In Different Places. A Wide Range Of Medicinal Plant Components Are Utilised For Extracting Raw Medicines And Have Different Health Effects (Srivastav Et. Al., 1996). New Compounds With Potential Therapeutic Properties In Drug Plants Are Considered Essential (Katrin Basha Et. Al., 2011). The Secondary Metabolites Of Plants Were Revealed To Be A Source Of Numerous Pests That Could Also Be Used Directly As An Intermediary In The Manufacture Of Novel Medications. Traditional Medicine Should Have An Even Bigger Part In The Current Primary Health System In Developing Nations.

Natural Medications Are Seen As More Agreeable To The Human Body, As Opposed To Contemporary Synthetic Treatments. The Main Reason Is That The Benefits From The Old Medical System Be Maximized To Ensure Sufficient Healthcare For Rural Populations (Ghani 1990). For Many Years, Nature Has Been A Primary Source Of Medical Goods. Impressive

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Numbers Of Contemporary Medications Have Been Identified Or Developed From Natural Resources Based On Their Usage In Traditional Medicine. Traditional And Current Scientific Investigations Have Demonstrated That A Good Association Between The Traditional Or Folk Usage Of Certain Plants Further Increases The Search For Pharmacological Active Components Of Plants (Egharevba And Kunle, 2010).

Given The Huge Potential Of Plants As Sources Of Antimicrobial Medicine, A Thorough Examination Of The Local Flora For Antibacterial Activity Of *Lagerstroemia Indicia* Was Conducted And Carried Out. The Popular Name For The Plant *L. Indica L.* That Belongs To The *Lythraceae* Family, Is Crape Myrtle. The Leaves And Blossoms Are Ascribed To Hydragog And Extreme Purgative Qualities. Bark Is Also Related With The Stimulant And Febrifuge Effects. Roots Contain Astringent Characteristics And Are Used As Gorges. Narcotic Characteristics In Seeds Can Be Detected (Yusuf Et Al, 2009). Annonaceae Is The Family Of *A. Reticulate*. *A. Reticulata* L. Is A Powerful, Tonic Astringent. It Was Utilised In The Wound Healing As Well As In Anti-Inflammatory, Anti-Stress, Anti-Mutagenic And Spasmolytic Agents, Anti-Stress, Antimutagenic And Spasmolytic Activity (Rastogi And Mehrotra, 1993).

Materials And Procedures

In The Campus Of Sacred Heart College (Autonomous), Tirupattur, Tamil Nadu, India, Fresh Leaves From Two Distinct Plants (Figure-1), Were Collected. Before The Air Is Dried By Sterile Blotters, The Leaves Were Cleared 2-3 Times With Running Water And Once With Sterile Water.

Figure-1
Leaves Of *Lagerstroemia Indica* And *Annona Reticulata*

Extraction Of Solvents

Two Leaves Of Plants Have Been Dried And Pulverized In Shade. In A Soxhlet Appliance (Figure-2), 250 G Of Powdered Material Was Packaged And Percolated For Eight Hours With 450 Ml Of Methanol As A Solvent. The Extract Was Vacuum-Concentrated And Desiccated. A Watery Extract Was Given By Cold Maceration. Around 50 G Of Powdered Material Were Combined And Kept At Room Temperature With 300 Ml Of Distilled Water For 7 Days. The Water Extract Was Filtered By The No. 1 Filter Paper And The Water Residue (40^0c) Was Evaporated Using A Heating Mantle. The Extracts Obtained Were Chilled And Dissociated Before Use In Dimethyl Sulfoxide. Two Gram-Positive Bacteria Were Utilised To Assess The Antibacterial Activities Of Staphylococcus Aureus And Salmonella Typhi And Three Gram-Negative Bacteria, *Klebsiella Pneumoniae, Proteus Vulgaris* And *Pseudomonas Aeruginosa*. The Bacteria Were Initially

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Collected At The Department Of Microbiology, Sacred Heart College (Autonomous), Tirupattur, Tamil Nadu, India.

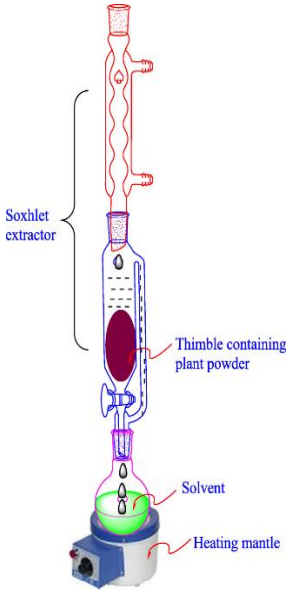

Figure-2

Screening Phytochemical

In The Key Groups Of Chemical Components In Their Colour Response, Phytochemical Screening Was Undertaken For The Methanol Extracts *Lagerstroemia Indica* And *Annona Reticulate* (Evans, 1997).

Inoculum Preparation

The Bacteria Were Precultivated In A Rotatory Shaker At 37^0c In A Nutrient Broth And Centrifuged For 5 Minutes In 10,000 Rpm. The Pellet Was Suspended In Dual Water With A Cell Density Of 660 Nm

Antimicrobial Properties

The Disc Diffusion Technique Was Employed To Examine *L. Indica* And *A. Reticulata* Methanol Leaf Extracts (Pharmacopoeia Of India, 1996). Different Concentrations (100 G/Ml) Were Achieved By Reconstituting The Extracts With Methanol. The Test Microorganisms Have Been Planted Into The Appropriate Medium By Utilising The Spread Plate Technique. 10ul With Nutrient Broth Growing Cultures For 24 Hours. Following Solidification On Test Organism Seed Plates, Filtered Paper Discs (5 Mm In Diameter) Soaked With The Extract Were Inserted. Streptomycin Sulphate (10 G/Ml) Was The Positive Control While Methanol Solvent (100 G/Ml) Was The Negative Control. The Antimicrobial Testing Plates Were Incubated At 370 Degrees Fahrenheit For 24 Hours. The Sizes Of The Inhibitory Zones Were Measured In Millimeters (Mm)

Results And Discussions

Screening Phytochemical

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On A Dry Weight Basis, The Extractive Value Of Methanol And Water Extract Was 14.52 Percent And 14.48 Percent. Methanol And Aqueous Extract Have Detected The Following Phytochemicals (Table.1).

Table 1

Different Group Of Phytochemicals Present In Methanolic AndAqueous Extract Of *L. Indica* And *A. Reticulata* Plant Leaves

Sl. No.	Phytochemicals	*L. Indica*		*A. Reticulate*	
		Methanol	**Aqueous**	**Methanol**	**Aqueous**
1.	Tannin	+	+	+	+
2.	Saponin	+	+	+	+
3.	Terpenoid	+	+	+	+
4.	Deoxy Sugars	+	+	+	+
5.	Phenolic Compounds	+	+	+	+
6.	Flavonoid	+	+	+	+

Table 2

Antibacterial Activity Of Methanol And Aqueous Extract (100 µg /Ml) Of *L.Indica* And *A. Reticulata* By Disc Diffusion Assay.

	Zone Of Inhibition* (In Mm.)				**Streptomycin Sulphate (10µg/Ml)**
Human Pathogenic Bacteria	***L. Indica***		***A. Reticulata***		
	Methanol	Aqueous	Methanol	Aqueous	
S. Aureus	12	8	11	10	22
S. Typhi	12	6	10	7	19
K. Pneumoniae	13	9	14	8	20
P. Vulgaris	20	5	18	4	21
P. Aeruginosa	16	7	16	6	20

*Values Are The Means Of Three Replications.

Activity Of Antimicrobials

The Study Shows That Two Extracts Of The Tested Medicinal Plants Possess Potential Antibacterial Activity Against *S. Aureus, S. Typhi, K. Pneumoniae, P. Vulgaris* And *P.*

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Aeruginosa. The Methanol Leaf Extracts From Plants Such As *L. Indica* And *A. Reticulata* Were Tested Using The Disco Diffusion Method To Demonstrate Significant Activity Against All Tested Microstructures Compared With Aqueous Extract (Table.2).

The Most Significant Antibacterial Activity Recorded In *P. Vulgaris* (20 Mm) And *P. Aeruginosa* (16 Mm), Followed By *L. Indica* Leaf Extracts In *S. Aureus* (12 Mm) And *S. Typhi* (12 Mm). Leaf Extracts Of A. Reticulata Also Exhibited Antibacterial Activity In Comparison With Aqueous Extracts In The Microorganisms Of *P. Vulgais* (18mm), *P. Aeruginosa* (16), *K. Pneumoniae* (14mm), *S. Aureus* (11mm), *S. Typhi* (10mm).

Many Components Of Plant Products Have Been Shown To Be Specifically Targeted Against Resistant Pathogenic Bacteria (Aqil Et Al., 2005), And There Has Recently Been A Lot Of Interest In Using Plant Material As An Alternative Method To Control Pathogenic Microorganisms (Aqil Et Al., 2005). (Nostro Et. Al., 2006). Multidrug-Resistant Strains Of Many Pathogens Have Emerged, Posing A Serious Threat And Making Chemotherapy More Difficult. Furthermore, The Current Cost Of Most Chemotherapeutic Agents Is Unaffordable For The General Public, Particularly In Developing Countries Such As India (Gopalakrishna Sarala Et. Al., 2010).

As A Result, Efforts Must Be Focused On Developing A Treatment That Is Both Effective And Non-Toxic. The Current Study Was One Of The First To Look Into The Antimicrobial Properties Of *L. Indica* And *A. Reticulata*. Plants Have Antiviral, Antibacterial, Antifungal, Anthelmintic, Antimolluscal, And Anti-Inflammatory Properties, According To Numerous Studies (Mahesh And Satish, 2008).

The Methanol Leaf Extracts Of *L. Indica* And *A. Reticulata* Showed Activity Against All Five Microorganisms Tested, But The Activity Against P. Vulgaris And P. Aeruginosa Was Particularly High. The Effectiveness Of Plant-Based Products As A Source Of Antimicrobial Compounds Has Been Demonstrated. Methanol Extracts Of A. Ferox And *W. Somnifera*, For Example, Were Found To Inhibit All Strains Of *N. Gonorrhoea* (Kambizi And Afolayan, 2008). The Antibacterial Activity Of Methanol And Aqueous Extracts Of Medicinal Plants Against Staphylococcus Species Was Found To Be Significant (Selvamohan Et. Al., 2012).

Antimicrobial Activity And Phytochemical Screening Of *D. Metel* Leaf Extracts Revealed Significant Antimicrobial Activity, With Photochemical Constituents Accounting For The Majority Of Antibacterial Activity (Niyas Et. Al., 2016). The Results Of This Study Show That The Methanolic And Aqueous Extracts Of Leaves From *L. Indica* And *A. Reticulata* Contain All Of The Phytochemical Constituents Studied With Minimal Variation. Thus, Their Potent Antimicrobial Activity Against *P. Vulgaris* And *P. Aeruginosa* Could Be Attributed To Phytochemicals Or Secondary Metabolites.

Conclusion

The Study Concludes By Determining The Utilisation Of A Useful Chemical To Build New, Diverse And More Potent Natural Antibacterial Treatments. Further Investigations Are Essential In The Detection And Evaluation Of Biologically Active Chemicals And The Effectiveness Of The Pathogenic Compound Microorganism Against Different Human Illnesses.

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Conflict Of Interest

The Creators Reported No Irreconcilable Situation. This Report Doesn't Contain Any Investigations With Human Or Creature Subjects Experienced By Any Of The Authors.

References

[1] Pharmacopoeia Of India, (1996). The Indian Pharmacopoeia, 3rdedn., Govt. Of India, New Delhi, Ministry Of Health And Family Welfare.

[2] F Aqil, Ms Khan, M Owais, And I Ahmad (2005). Effects Of Certain Bioactiveplant Extracts On Clinical Isolates Of Beta Lactamase Producing Methicillin Resistant *Staphylococcus Aureus. J. Of Basic Microbiology*. 45:106-114.

[3] M. I. Niyas Ahamed And M Reyes (2016). /Life Science Archives (Lsa), Volume – 2, Issue – 6., 854-858

[4] Ho Egharevba, And Of Kunle (2010). Preliminary Phytochemical Andproximate Analysis Of The Leaves Of Piliostigma Thioninin Gii (Schumach) Mile-Redhead. *Ethnobotanical Leaflets*. 14:570-577.

[5] Wc Evans, 14th Edn. Trease And Evans Pharmacognosy. Harcount Brace Andcompany Asia Ltd., India (1997).

[6] A Ghani, (1990). In Traditional Medicine. Jahangirnagar University, Savar Dhaka: 1990. P.15-40.

[7] Gopalkrishnan Sarala, George Shibumon And Pj Benny (2010). Antimicrobial Effect Of Punica Granatum On Pyogenic Bacteria. *J. Of Pharma And Biomed Sci*.3(6).

[8] B Mahesh And S Satish (2008). Antimicrobial Activity Of Some Importantmedicinal Plant Extract Against Plant And Human Pathogens. *World J. Of Agri.Sci. 4*(S): 839-843.

[9] A Nostro, L Cellini And S Di Bartolomeo (2006). Effect S Of Combining Extracts (From Propolis Or Zingiber Officinale) With Clarithromycin On Helicobacter Pylori. *Phytotherapy Research*. **20(3)**: 187-190.

[10] Rastogi And Mehrotra (1993). Imoedium Of Indian Medicinal Plants Cdr(Luknow). 2:496.

[11] T Selvamohan, V Ramadas And S Shiba Selva (2012). Antimicrobial Activityof Selected Medicinal Plants Against Some Selected Human Pathogenic Bacteria. *Advance In Applied Science Research*. 3(5): 3374-3381.

[12] J Srivastava, Lambert And V Vietmeyer (2006). Medicinal Plants: Anexpanding Role In Development. *World Bank Technical Paper*. No. 320