An Evaluatory Screening of the Antibacterial Activities' Efficiency of Seed Kernel of the Mimusops elengi L. (Sapotaceae)

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Abstract: The study was carried out, for evaluatory screening of; Antibacterial Potential of Seed kernel of Mimusops elengi L. (Sapotaceae).In this study aqueous-ethanolic (9 ml. of distilled water &1 ml. of ethanol) extract and ethanolic extract of M. elengi's seed kernel were tested by using Agar Well Diffusion (A.W.D.) method. Medically Significant Bacterial Strains (M.S.B.S.) were inoculated into the both extracts of the M.elengi, incubated and investigated for Inhibitory Potential (I.P.) of both the extracts. Ethanolic extract showed a significant Antibacterial Potential (Zone of Inhibition) against pathogenic bacteria i.e.; Salmonella typhimurium-2501, Klebsiella pneumoniae-2457 and Bacillus megaterium-2326. Whereas aqueous-ethanolic extract showed the highest Inhibitory Potential against Klebsiella pneumoniae-2457.All the chosen bacterial strains were tremendously inhibited by aqueous-ethanolic seed kernel extract of M.elengi L. than the ethanolic extract of the same.

Key words: Antibacterial Potential, Seed kernel of Mimusops elengi L., aqueous-ethanolic extract, Ethanolic extract, Medically significant bacterial strains, Agar well diffusion method and Inhibitory zone.

INTRODUCTION: The vast majority of modern medications were derived originally from ancient herbal traditions. The practices of plant based traditional medicine are founded on hundreds of years of belief and observations, which predate the development of modern medicine. Medicinal plants have been used for centuries as remedies for human diseases as they contain components of therapeutic value.(13) During the second half of the 20th century, the acceptance of traditional medicine as an alternative form of health care and the development of microbial resistance to the classical antibiotics led researchers to investigate the antimicrobial activities of medicinal plants. Antimicrobials of plant origin have enormous therapeutic potential. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials.(Demetrio L. et al)

Mimusops elengi L. (Sapotaceae)

Common Name: Spanish Cherry

Telugu Name: Pogada

Spanish cherry is an evergreen tree with a dense, rounded, spreading crown; it usually grows from 15 - 30 meters tall, exceptionally to 40 meters. The tree provides food, medicine and a range of commodities for the local people. It is often cultivated in the tropics and subtropics, as an ornamental (where it is particularly valued for its fragrant flowers), in order to provide shade along roads and in gardens, and also for its wide range of uses. It is widely found in E. Asia - India, Sri Lanka, Thailand, Malaysia, Indonesia, Philippines, New Guinea and Northern Australia. And it is most commonly found in seasonally dry habitats.

The bark is astringent, bitter and tonic. It is used in the treatment of diarrhoea and dysentery. A decoction of the bark, sometimes mixed with the flowers, is used as a gargle to treat gum inflammation, toothache etc. The leaves are used to treat headache, toothache, wounds and sore eyes. The flowers have been used as a remedy against diarrhea. The wood is heavy, very hard, very strong and tough; very durable, even when exposed to the weather or in contact with the ground. The wood is used for heavy general construction, building purposes, boat and shipbuilding and bridges (*Plant resources of Tropical Asia*). The contamination of food by microorganisms is a worldwide public health concern and is a leading cause of trade problems internationally.To avoid these problems, medicinal plants can be used to that the prevent the food borne microorganisms as a tool of preservatives during food processing and to design adrug. (14***)***

In the present study, the aqueous-ethanolic and ethanolic Seed kernel extracts of species Mimusops elengi L. were analyzed to investigate the efficiency of antibacterial activity. The plant species,s efficacy of inhibitory capacity against different chosen bacteria is discussed.

MATERIALS AND METHODS

Collection of plant material: The plant was identified by referring (Compendium of medicinal plants) and collected at one of the areas of West Godavari district in Andhra Pradesh, India. Under the guidance of Dr.B.G.Solomon Raju the plant material was collected in the wee hours. Fleshy outer fruit was removed and seeds were dried in shade for a few days. From the dried seeds seed kernel was collected and it was also allowed for drying in shade in order to prepare extract from it.

Preparation of the Extracts: The dried seed kernels of Mimusops elengi L. were ground in a mixer to make powder. About 100g of powder was taken into 500 ml conical flask and about 250 ml of 45% ethanol was added to conical flask to get extract, which was sealed with sterile cotton plug to avoid contamination. The conical flask was placed at 37^{0} C temperature for 7 days and was shaken at regular intervals for proper dissolution of the extract. After 7days this solution was filtered by Whatman A filter paper. The filtrate was taken into a china dish and placed in water bath and heated at 45^{0}c temperature to get crude extract. After evaporation of solvents distilled water and ethanol the crude extract was collected and placed in a desiccator to evaporate all the moisture content in the crude extract. The extract was prepared under the guidance of Miss Y.B.Manju latha, Faculty of Microbiology.

Dilution Preparation: About 1g of crude extract was taken into a sterile test-tube and it was diluted by adding about 10 ml of ethanol to it to get ethanolic seed kernel of Mimusops elengi L. Similarly about 1g of crude extract of the same was taken into a sterile test tube and about 9ml of distilled water and 1 ml of ethanol were added to the test tube to get aqueous-ethanolic seed kernel extracts. Both aqueous-ethanolic and ethanolic extracts were evaluated for their potential of antibacterial activity**.**

Test Organisms: The chosen bacterial strains like Slamonella typhimurium-2501, Klebsiella pneumoniae–2457, Escherichia coli–2831,Bacillus cereus-2461,Pseudomonas aeruginosa-2037,Staphylococcus aureus–2654,Proteus vulgaris–2027 and Bacillus megaterium–2326 were procured from National Collection for Industrial Microorganisms (N.C.I.M.) Pune, India. The pure cultures were sub-cultured and maintained on Nutrient Agar slants and stored in a refrigerator at 4^{0}c for further use.

Inoculum preparation: Bacterial inoculum was prepared by inoculating a loopful of test organism's culture into about 5 ml of Nutrient Agar broth, incubated at room temperature for 24 hours and it was used for antibacterial assay.

Antibacterial Potential Assay by Agar Well Diffusion Method: The potential of Antibacterial activity of, chosen plant species seed kernel aqueous-ethanolic and ethanolic extracts; were determined by agar well diffusion method. Nutrient Agar was used as media. Molten Nutrient Agar medium of 20 ml was inoculated with each test organism (bacterial strain) and was poured in to sterile Petri plate which was left for solidification of media. After solidification of Nutrient Agar 05 mm of bores were made with borer in the media. Bores were inoculated by aqueous-ethanolic and ethanolic seed kernel extracts of Mimusops elengi L. and Petri plates were placed in a refrigerator for 20 minutes for diffusion purpose. After that Petri plates were incubated at 37^{0} C temperature for 24 hours to examine inhibitory zone against inoculated Bacterial strain.

RESULTS AND DISCUSSION:

Traditionally used medicinal plants produce a variety of compounds of known therapeutic properties. One of the vital activities possessed by these medicinal plants is antimicrobial.The scarcity of infective diseases in plants is in itself an indication of the successful defense mechanisms developed by them .The substances that can either inhibit the growth of bacteria or kill them, with no toxicity or minimum toxicity to host cells are considered candidates for developing new antimicrobial drugs . Some of the bioactive compounds could hinder the life processes of disease-causing bacteria, either by itself or in combination with other therapeutic agents .In recent years,antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world.(Demetrio L et al.) *Mimusops elengi* has various pharmacological properties proved by experimental studies. Based on the different studies on different parts of *Mimusops elengi*, there is a grim need to isolate and identify new compounds from different parts of the tree and also more studies are needed before the pharmacological properties of *Mimusops elengi* can be utilized in therapy. (Mariyam Roqaiya et al.)

Aqueous-ethanolic Seed Kernel Extract of Mimusops elengi L. (Sapotaceae) showed good inhibitory capability against all the chosen bacterial strains.The highest zone of inhibition **(16 mm) diameter** was showed against Klebsiella pneumoniae-2457 and it also showed a very low inhibitory zone against Bacillus cereus-2461 that was **(2 mm) diameter.** It showed moderate zone of Inhibition (**13 mm) diameter** against Bacillus megaterium-2326.The extract produced same diameter of bacterial inhibitory zone **(8 mm)** against both Escherichia coli-2831 and Salmonella typhimurium-2501. And **(10 mm), (9 mm) and (6 mm)** diameter inhibitory zones were appeared against Pseudomonas aeruginosa-2037, Proteus vulgaris-2027 and Staphylococcus aureus-2654 respectively.

Ethanolic ***seed kernel*** extract of ***M. elengi L. showed antibacterial activity efficiency*** against someof the bacteria and the bacterial resistance (formation of inhibitory zone) was not appeared against some of the chosen bacteria. It produced ***(*16 mm) diameter** of inhibitory zone against Salmonella typhimurium-2501 which was the highest zone of the inhibition among all the tested bacteria. Fifteen (**15 mm) diameter** of Inhibitory zone was produced against both Bacillus megaterium-2326 and Klebsiella pneumoniae-2457. Against Bacillus cereus-2461 about **(8 mm)** inhibitory zone diameter was appeared and **(6 mm) diameter** zone of inhibition was observed against Proteus vulgaris-2027. The extract did not form inhibitory zone against Staphylococcus aureus-2654, Escherichia coli-2831 and Pseudomonas aeruginosa-2037.

Comparatively the Aqueous-ethanolic extract of Mimusops elengi's Seed Kernel showed more potential of antibacterial activity than that of Ethanolic Extract of the same. Because Aqueous-ethanolic extract produced inhibitory zones against all the chosen bacteria but in the ethanolic Seed Kernel extract there was no any antibacterial activity (inhibitory zones of bacteria) against Staphylococcus aureus-2654, Escherichia coli-2831 and Pseudomonas aeruginosa-2037.

Table-1: Mimusops elengi L. (Sapotaceae) Aqueous-ethanolic Extract's Inhibition Potential

S.No & Test Organism	**Antibacterial Potential**
1. Bacillus megaterium-2326	13
2. Staphylococcus aureus-2654	6
3. Bacillus cereus-2461	2
4. Klebsiella pneumoniae-2457	16
5. Escherichia coli-2831	8
6. Salmonella typhimurium-2501	8
7. Proteus vulgaris-2027	9
8. Pseudomonas aeruginosa-2037	10

*Zone of inhibition in mm

Table-2: Mimusops elengi L. (Sapotaceae) Ethanolic Extract's Inhibition Potential

S.No & Test Organism	**Antibacterial Potential**
1. Bacillus megaterium2326	15
2. Staphylococcus aureus-2654	0
3. Bacillus cereus-2461	8
4. Klebsiella pneumonia-2457	15
5. Escherichia coli-2831	0
6. Salmonella typhimurium-2501	16
7. Proteus vulgaris-2027	6
8. Pseudomonas aeruginosa-2037	0

*Zone of inhibition in mm

Table-3: Aqueous-ethanolic and Ethanolic Extracts' Inhibition Potential ***Mimusops elengi L. (Sapotaceae)***

S.No & Test organism	**Antibacterial potential**	
	Aq.	Eth.
1. Bacillus megaterium-2326	13	15
2. Staphylococcus aureus-2654	6	0
3. Bacillus cereus-2461	2	8
4. Klebsiella pneumoniae-2457	16	15
5. Escherichia coli-2831	6	0
6. Salmonella typhimurium-2501	8	16
7. Proteus vulgaris-2027	9	0
8. Pseudomonas aeruginosa-2037	10	0

*Zone of inhibition in mm , Aq. – Aqueous Rhizomic Extract, Eth.- ethanolic RhizomicExtract

CONCLUSION:

After screening of antibacterial activity potential of aqueous-ethanolic and ethanolic extracts of seed kernel with pathogenic bacteria, it is concluded that Mimusops elengi L. has bacterial resistance. It is useful in Ethno medical investigation**.**

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