

Antibacterial activity of crude dried leaf extracts of some plants from various locations of Palghar, M.S., India

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(Received 20 June, 2023; Accepted 27 August, 2023)

ABSTRACT

Many plants contain constituents that exhibit antibacterial activity. Tribes in Palghar district still depend on medicinal plants available nearby in the region and most of them are used for first aid remedies, to treat cough, cold, fever, headache, wounds and some simple ailments. The present study aimed to check the antibacterial activity of these plants found at various locations in Palghar district of Maharashtra. The study was carried out using the crude extracts of dried leaves, these plants are used as medicines by the folk tribes of Palghar. The medicinal plants used in study were *Abrus precatorius*, *Adhatoda vasica*, *Calotropis gigantea*, *Crotalaria retusa*, *Jatropha gossypifolia*, and *Vitex negundo*. The antibacterial activity of methanolic, ethanolic and Aqueous dried leaf extracts of these plants were tested on the laboratory cultures of the pathogenic organisms namely *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, and *Pseudomonas aeruginosa* using Agar diffusion method. From the study carried out, except for *Calotropis gigantea* and *Jatropha gossypifolia* all plant leaf extracts were observed to have some antimicrobial activity against at least one reference bacterial strain. It was observed that methanolic and ethanolic dried leaves extracts of the plants used in the study were found to be more effective against the reference strains, as compared to the aqueous extract.

Key words: Medicinal plants, Palghar, Antibacterial, Leaf extract, Bacteria.

Introduction

Plants are considered as a rich resource of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms and therefore can be used in drug development of pharmacopoeial, non-pharmacopoeial or synthetic drugs (Introduction and Importance of Medicinal Plants and Herbs: National health portal). Traditional healers have long used plants to prevent or cure infectious conditions. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, al-

kaloids, and flavonoids, which have been found in vitro to have antimicrobial properties. This study attempts to summarize the current status of screening efforts, to test the effectiveness of some plants native to Palghar, which are part of the folk medicines used by the tribes residing in Palghar for various ailments like gastrointestinal and respiratory tract infections.

The plants like *Abrus precatorius* (com.name-gunjja), *Adhatoda vasica* (com.name-Adulsa), *Calotropis gigantea* (com.name-rui), *Crotalaria retusa* (com.name-Dingala), *Jatropha gossypifolia* (com.name-erandi), *Vitex negundo* (com.name-

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Results and Discussion

The present study on crude dried leaves extracts of some medicinal plants from various locations of Palghar, Maharashtra, describes the antimicrobial activity against Gram positive (*Staphylococcus aureus*, *Bacillus subtilis*) and Gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) pathogens.

In the present study carried out, it was found that the dried leaves ethanolic extract of *Abrus precatorius* inhibited *Staphylococcus aureus*, *Bacillus subtilis* and *Pseudomonas aeruginosa* (17 mm, 11 mm, 06mm). Also from the present study it was observed that methanolic leaf extract of *Abrus precatorius* was effective against *Staphylococcus aureus*, *Bacillus subtilis* and *Pseudomonas aeruginosa*. (20mm, 12 mm and 09 mm).

In the present study Aqueous extract of *Adhatoda vasica* was found to be effective against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* (04mm, 04mm, 06 mm); whereas ethanolic extracts of the leaves of *Adhatoda vasica* inhibited *Staphylococcus aureus* and *Escherichia coli* (03mm and 04mm). From the study carried out by Gohel *et al.*, (2021), similar results were found for the ethanol leaf extract of *Adhatoda vasica* which inhibited *Staphylococcus aureus* and *Pseudomonas aeruginosa*. But none of the extracts inhibited the *Pseudomonas aeruginosa* as found by Gohel *et al.* (2021)

In the present study, for aqueous and methanolic extract of *Crotalaria retusa*, inhibition was observed for *Staphylococcus aureus* (04 mm and 06 mm) and *Pseudomonas aeruginosa* (09mm and 07 mm). Also the ethanolic extract of *Crotalaria retusa* was effective against *Pseudomonas aeruginosa*(08mm). Similar study carried out by Bellary *et al.*, (2012) for the ethanol extracts of leaves of *Crotalaria retusa* showed inhibition only against *Pseudomonas aeruginosa*.

Aqueous, ethanol and methanolic extracts of *Vitex negundo* inhibited *Staphylococcus aureus* (09 mm, 10 mm and 15 mm) and ethanolic and methanolic extracts inhibited *Bacillus subtilis* (06 mm and 10 mm) whereas the no extracts of *Vitex negundo* inhibited Gram negative organisms used in the study. Similar observations were made by Kurapatti *et al.* (2017) who reported that maximum inhibitory activity of the ethanolic leaf extract was observed against *Staphylococcus aureus* and minimum inhibition was observed for gram negative pathogens *Escherichia coli* and *Pseudomonas aeruginosa*.

No extracts of dried leaves of *Calotropis gigantea* and *Jatropha gossypifolia* showed any zone of inhibition against any of the test organisms used in the present study.

Conclusion

Based on the results of the present study it can be concluded that the antimicrobial activity against the Gram negative and Gram positive bacteria was found more in the ethanolic and methanolic extracts, as compared to the aqueous extract. Of the plants selected for the study ethanolic and methanolic leaves extracts of *Abrus precatorius* were found to be more efficient in inhibiting the *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* as compared to other plant extracts. Aqueous extract of *Adhatoda vasica* was showing better inhibition against *Escherichia coli* and *Staphylococcus aureus* was inhibited more by methanolic leaf extract of *Crotalaria retusa*, as compared to other organisms

In the present study, aqueous and ethanol leaf extract of *Vitex negundo* effectively inhibited *Staphylococcus aureus* and its methanolic extract inhibited both Gram positive organisms. Thus, the extracts of the plants selected in the study can be used for future references and exploration of plants as a source of antimicrobials. More of these compounds can be subjected to animal and human studies to determine their effectiveness in whole-organism systems.

Acknowledgement

The authors are thankful to the Management and Principal of Sonopant Dandekar Arts, V.S. Apte Commerce and M. H Mehta Science College, Palghar for encouraging research work. Also they extend their thanks to the people from various parts of Palghar for sharing the medicinal information about the folk plants used in the study.

References

- Bhakta, S. and Das, S.K. 2020. The medicinal values of *Abrus precatorius*: a review study: Volume3 Issue2
- Bellary, N. D.*, Nakka, S. and Solmon, K.S. 2012. A comparative pharmacological and phytochemical analysis of in vivo & in vitro propagated *Crotalaria* species. *Asian Pacific Journal of Tropical Medicine*. 37-41
- Thakur, D., Krishanender, D., Sharma, M., Panda, A.K., Masand, R. and Padwalia, R. 2020. In Vivo Evalua-

- tion of Acaricidal Potential of Few Herbs from Hilly Regions of Himachal Pradesh. *International Journal of Livestock Research*. 10: 15-17
- Dr. Lokhande, N. 2020. Spices and Medicinal Plants of the Holy Bible .
- Kumar, G., Loganathan, K. and Rao Kokati, V. B. 2010. Antibacterial Activity of Aqueous Extract of *Calotropis Gigantea* Leaves – An In Vitro Study. *International Journal of Pharmaceutical Sciences Review and Research*. 4(2): Article 024.
- Introduction and Importance of Medicinal Plants and Herbs: National health portal
- Leal, C.K.A. and Agra, M.D.F. 2005. Estudo farmacobotânico comparativo das folhas de *Jatropha molissima* (Pohl) Baill. *Acta Farmaceutica Bonaerense*. 24(1): 5–13.
- Oka, C. U. and Nweze, E.I. 2020. Antibacterial Activity of *Abrus precatorius* (Linn.) Leaf Extract Against Multi-resistant Wound Bacterial Isolates. *Research Journal of Medicinal Plants*: 88-95.
- Kurapatti, P., Kulandhaivel, M. Anbalagan, S. and M.Sankareswaran 2017. Phytochemical Analysis and Antibacterial Activity of *Vitex negundo* Leaf Extracts against Clinically Isolated Bacterial Pathogens. *Int. J. Pharm. Sci. Rev. Res.* 46(1):183-187
- Nakka, S. 2013. Analysis of pyrrolizidine alkaloid from *crotalaria retusa* L. *Der Pharma Chemica*. 5(6): 6-11
- Sunday, O. Okoh, Benson C. Iweriebor, Omobola O. Okoh, Uchechukwu U. Nwodo, and Anthony I. Okoh, 2016 Antibacterial and Antioxidant Properties of the Leaves and Stem Essential Oils of *Jatropha gossypifolia* L., *BioMed Research International*. 2016 | Article ID 9392716
- Upadhye, V.*, Gohel A., Upadhyay T., Rami E., Panchal R., Jadhav, R., Dhakane, R. and Kele, V. 2021. Study on Phytochemical Screening and Antimicrobial Activity of *Adhatoda Vasica*. *Canadian Journal of Medicine*. 3: 105-113.
- Vanessa, P. and Baldin, A. 2018. Anti-*Mycobacterium tuberculosis* activity of essential oil and 6,7-dehydroroyleanone isolated from leaves of *Tetradenia riparia* (Hochst.) Codd Lamiaceae: *Phytomedicine*. 47(1): 34-39.
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