Dedicated to my Family

"Research is formalized curiosity. It is poking and prying with a purpose"

Zora Neale Hurston

Declaration

I declare that the thesis entitled "Medicinal and molecular profiling of selected Rutaceous members with a focus on *Citrus* L." has been prepared by me under the supervision of Prof. Arnab Sen, Department of Botany, University of North Bengal. No part of the thesis has formed the basis for the award of any degree or fellowship previously.

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It is certified that the work contained in the thesis titled **"Medicinal and molecular profiling of selected Rutaceous members with a focus on *Citrus* L."** by **"Ms. Mousikha Lala"** has been carried out following University guideline and it has been approved by the members present in the meeting of the Departmental Research Committee in Botany for processing by the Board of Research Studies.

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Preface

India is always known to be rich depository of medicinal plants and various forms of herbal medicine practices are considered as "living tradition". Not only in India, globally, traditional herbal medicines have played a vital role in health systems, and are used to treat various acute and chronic conditions without or minimal toxic effect.

"Ebers Papyrus", Egyptian traditional medicine based record of 2900 BC is one of the most conserved record comprising of 700 plant derived drugs. Both Indian Ayurveda and traditional Chinese medicine system were recorded over a millennium period. The classical Indian texts on human medicine include Rigveda, Atharva Veda, Charaka Samhita and Sushruta Samhita. Ayurveda, the oldest medical system in Indian sub-continent, has alone reported approximately 2000 medicinal plant species, followed by Siddha and Unani. The Charak Samhita, an age-old written document on herbal therapy, reports on the production of 340 herbal drugs and their indigenous uses.

The vast range of medicinal plants distributed around the world is highly remarkable. According to reports, around 70,000 plant species from the lower level of lichens to higher level of trees are have been proven to have the potential for treating various illnesses. Based on WHO, 21,000 medicinal plants are in use for various medical applications. More than 100 genera of plants which are being used in the indigenous medicinal practices in different part of the world belong to India. India provides the best quality and quantity of medicinal plants and stands second in ranking in terms of export. It is considered as one of the 12 mega biodiversity hotspots of the world with 16 agro-climatic zones and has wide range of about 45,000 plants out of which 7000 plant species are recognized as medicinal plants. Herbal plants are often used as a natural remedy to cure various health problems including

tuberculosis, cancer, diabetes mellitus, heart diseases, wound healing, asthma, pharyngitis, hypertension etc. Plants rich in bioactive phytomedicine compounds such as alkaloids, flavonoids, tannins and polyphenols have been used to cure illnesses because of their various pharmacological properties.

Herbal medicine is considered to be one of the most important science bases for both ancient and advanced medical system. Consequently, a significant increase in the exploration and usage of herbal medicines by major developing countries over the past few decades may be observed. As stated by the World Health Organization (WHO) use of traditional medicines (including herbal drugs) is considered as therapeutic practices that came forth into emergence hundreds of years ago and is still in practice till date. Allopathic medicine may cure a wide range of diseases; however, its high prices and side-effects are causing many people to return to herbal medicines which have fewer side effects.Currently, approximately 25% of drugs are derived from plants, and many others are synthetic analogues built on prototype compounds isolated from plant species in modern pharmacopoeia.

The work of this thesis was started in the year 2017 with the objectives of qualitative and quantitative assay of different phytochemicals present in the Rutaceae family along with their antioxidant and anti-inflammatory properties. It is already known that *citrus* fruits have several beneficial effects but the utility of *citrus* leaves remains largely obscured and there are very few reports regarding their application in different biological aspects especially in the Covid situation. The thesis starts with an introduction where the objectives are given. A review on the present status of medicinal and biological aspects of *citrus* and their implementation in nano technology have been given in the next chapter. The materials and methods, result, discussion with references to the present findings are presented in separate chapters. Bibliography and other supplementary details are given as appendix at the end of the thesis.

Mousikha Lala
02/02/2024

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