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Evaluating the Antioxidant Efficacy of *Plumeria obtusa L.*

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ABSTRACT

This study investigates Plumeria obtusa's antioxidant qualities, a plant known for its medicinal and decorative benefits. We assessed its capacity to neutralize free radicals, a crucial measure of antioxidant activity, using DPPH and ABTS radical scavenging tests. The findings demonstrate that P. obtusa exhibits a dose-dependent increase in scavenging activity, with 60% scavenging in the DPPH assay and 55% in the ABTS assay at 500 µg/ml, respectively, increasing to 70% and 60% at 1000 µg/ml. As a standard reference, ascorbic acid demonstrated greater antioxidant activity, scavenging 90% and 100% in the DPPH assay and 80% and 90% in the ABTS assay at the same doses. This comparison demonstrates that ascorbic acid exhibits greater antioxidant activity than P. obtusa, despite the latter's significant potential. However, P. obtusa's notable antioxidant activity suggests that it may be used to create natural antioxidant treatments in addition to supporting the plant's potential as an antioxidant source. It is recommended that more research be done to better understand and improve P. obtusa's therapeutic uses, particularly in fields looking for natural antioxidants.

Keywords: *Plumeria obtusa's, antioxidant, medicinal, decorative benefits, DPPH radical scavenging tests, ABTS radical scavenging tests, natural antioxidants*

INTRODUCTION

Plumeria obtusa is a blooming plant of the Apocynaceae family, also referred to as ivory frangipani or the Singapore grave flower. The plant species in question is well-known and valued for both its many therapeutic and medical uses as well as its aesthetically pleasing characteristics. The plant species Plumeria obtusa, which is well-known for its therapeutic qualities, has been used extensively in many traditional medical systems all over the world. This plant has a long history of usage in traditional medicine, demonstrating its adaptability and effectiveness in treating a variety of illnesses. Herbal medicine fans and researchers alike have recently shown a great deal of interest in the pharmacologic potential of this topic. Plumeria obtusa is one of the natural chemicals whose chemistry and pharmacological properties are becoming more and more understandable in our day and age of scientific and technological breakthroughs. The utilization of sophisticated analytical techniques and computer tools has enabled this. The progress and advancement of insightful techniques, specifically the utilization of "Fused Mass Spectrometry and Liquid Chromatography (FC-MS/MS)" has extraordinarily worked on scientists' ability to get more significant understandings of the complex atomic cosmetics of natural materials, similar to Plumeria obtuse.

Figure 1: Plant Profile: Plumeria Obtusa

Fluid chromatography-tandem mass spectrometry (LC-MS/MS) is an incredibly advanced scientific technique that enables the simultaneous identification and quantification of innumerable compounds. Because of this, it's a priceless instrument for doing a thorough examination of intricate plant extracts.

Through the combination of liquid chromatography's separation power and tandem mass spectrometry's sensitivity and specificity, LC-MS/MS allows researchers to better comprehend the chemical composition of with the use of this cutting-edge technique, Plumeria obtusa's complex phytochemical composition may be thoroughly analyzed and assessed. This procedure clarifies the precise ingredients that give it its extraordinary restorative abilities.

1. LITERATURE REVIEW

Baldelli et al. (2016), conducted a study focused on validating an LC-MS/MS method for measuring dabigatran, rivaroxaban, and apixaban in human plasma simultaneously. The rationale behind this study was the increasing use of these oral anticoagulants in their pure form and the need for a reliable method to measure their amounts at the same time. An LC-MS/MS technique that can accurately measure apixaban, rivaroxaban, and dabigatran in human plasma was developed and validated by the experts. The technique's accuracy, proportionality, selectivity, and correctness were all assessed during the verification procedure. The availability of this test enables medical professionals to monitor many anticoagulants at the same time, ensuring the patients' well-being. This investigation is essential for laboratories and healthcare professionals because it offers a validated analytical tool for measuring three commonly used direct oral anticoagulants simultaneously, increasing the efficacy of anticoagulant therapy monitoring.

Baig and Ali (2017), presented an approved LC-MS/MS technique for deciding how much apixaban in human plasma. The purpose of the task was to fabricate a robust and solid scientific strategy for the measurement of the immediate oral anticoagulant apixaban in clinical samples. The authors painstakingly created and checked a LC-MS/MS method to measure the concentrations of apixaban in human plasma. They provided a detailed explanation of the validation of the method, including accuracy, consistency, responsiveness, and correctness. This test ensures an accurate assessment of apixaban levels, which is essential for dosage optimization and medical monitoring of patients on this blood thinner. For doctors and laboratory specialists,

the research is extremely significant because it offers a proven analytical method for precise apixaban measurement, ensuring the safe and effective use of this anticoagulant.

Slavik et al. (2018), planned to think about the numbers of Novel Oral Anticoagulants (NOACs) with functional coagulation evaluations by using Fluid Chromatography-Mass Spectrometry/Mass Spectrometry (LC-MS/MS). The rationale for this study stems from the need for an accurate and comprehensive evaluation of NOACs in clinical practice, given their growing use as alternatives to traditional anticoagulants like warfarin. The researchers used the highly sensitive and accurate analytical technique of LC-MS/MS to measure the amounts of NOAC in patient sample. To assess the consistency between the two methods, they compared these values to the results of operative coagulation assays. Findings from this study provide insights into the reliability and accuracy of several NOAC measuring techniques, supporting their clinical monitoring and administration. For medical professionals, this study is essential since it addresses the critical issue of NOAC surveillance and provides guidance on selecting suiTable4.examinations for clinical use.

Byon et al. (2019), provided a thorough analysis of apixaban's clinical pharmacokinetic and pharmacodynamic properties. The study aims to summarize the state of knowledge on the pharmacologic properties of apixaban and its therapeutic implications. This evaluation is warranted by the need for a single, up-to-date source on apixaban, considering how widely it is used in therapeutic settings. The authors conducted a thorough review of the literature to compile and combine information about the pharmacokinetics, pharmacodynamics, and clinical importance of apixaban. They discussed important aspects of apixaban's absorption, distribution, metabolism, and excretion, as well as how it interacts with other drugs and what the therapeutic implications are. For medical professionals and researchers to fully understand the therapeutic utility, security, and potential consequences of apixaban for patient care, this evaluation is essential.

Frost et al. (2013), examined the pharmacokinetics, safety, and pharmacodynamics of apixaban; Samama et al. (2012) and Raghavan et al. (2009) examined the metabolism and pharmacokinetics of apixaban and the need for laboratory surveillance of NOACs, respectively. Together, this research advances our knowledge of NOACs by addressing topics including

pharmacokinetics, pharmacodynamics, laboratory surveillance, and quantification-related analytical techniques.

2. RESEARCH METHODOLOGY

3.1 Research Design

Plumeria obtusa L. is evaluated for its antioxidant efficacy by its DPPH and ABTS radical scavenging capabilities in this study, which makes use of an experimental research design. Plumeria obtusa and ascorbic acid are used as controls in this comparative study, which aims to evaluate the relative antioxidant capacity of several different substances.

2.2 Data Collection

The DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azinobis (3-ethylbenzothiazoline-6-sulfonic acid) radical scavenging tests are the two primary assays that are utilized in the process of measuring antioxidant activity. Five hundred, one thousand, and one thousand and five hundred µg/ml of Plumeria obtusa and ascorbic acid are synthesized as sample concentrations. After determining the percentage of radical scavenging activity at each concentration, a comparison is made between the compounds that are being tested and those that are serving as controls.

2.3 Data Analysis

Using the following formula, the antioxidant activities of Plumeria obtusa and ascorbic acid are evaluated. This is accomplished by estimating the percentage of radical scavenging activity:

$$\text{Scavenging Activity (\%)} = \frac{\text{Absorbance of Control} - \text{Absorbance of sample}}{\text{Absorbance of Control}} \times 100$$

In order to facilitate comparative analysis, the data are supplied in tabular format and are also visually depicted in graphs. For the purpose of determining the significance of the variations in the activities of Plumeria obtusa and ascorbic acid throughout a range of concentrations, statistical analysis is carried out.

2.4 Sample Area

In order to carry out the study, samples are gathered from Meerut, which is located in Uttar Pradesh. The area that was chosen ensures that the findings will be relevant to the local flora and that they will have possible uses in antioxidant research in the region.

3. DATA ANALYSIS

4.2 DPPH radical scavenging activity

The DPPH scavenging activity of *P. obtusa* and ascorbic acid increases with concentration. At 500 µg/ml, *P. obtusa* exhibits 60% scavenging activity, while ascorbic acid shows a higher 90% scavenging activity. At 1000 µg/ml, *P. obtusa*'s activity rises to 70%, though ascorbic acid reaches 100% scavenging. No data is available for *P. obtusa* at 1500 µg/ml, but ascorbic acid's activity at this concentration remains unreported. These results suggest that while *P. obtusa* demonstrates antioxidant potential, ascorbic acid is more effective at scavenging DPPH radicals, with a greater percentage of activity observed at lower concentrations.

Table 1. DPPH activity of P. obtusa and ascorbic acid.

Concentration (µg/ml)	**% DPPH Scavenging activity**	
	P. obtusa	**Ascorbic acid**
0	0	0
500	60	90
1000	70	100
1500	-	-

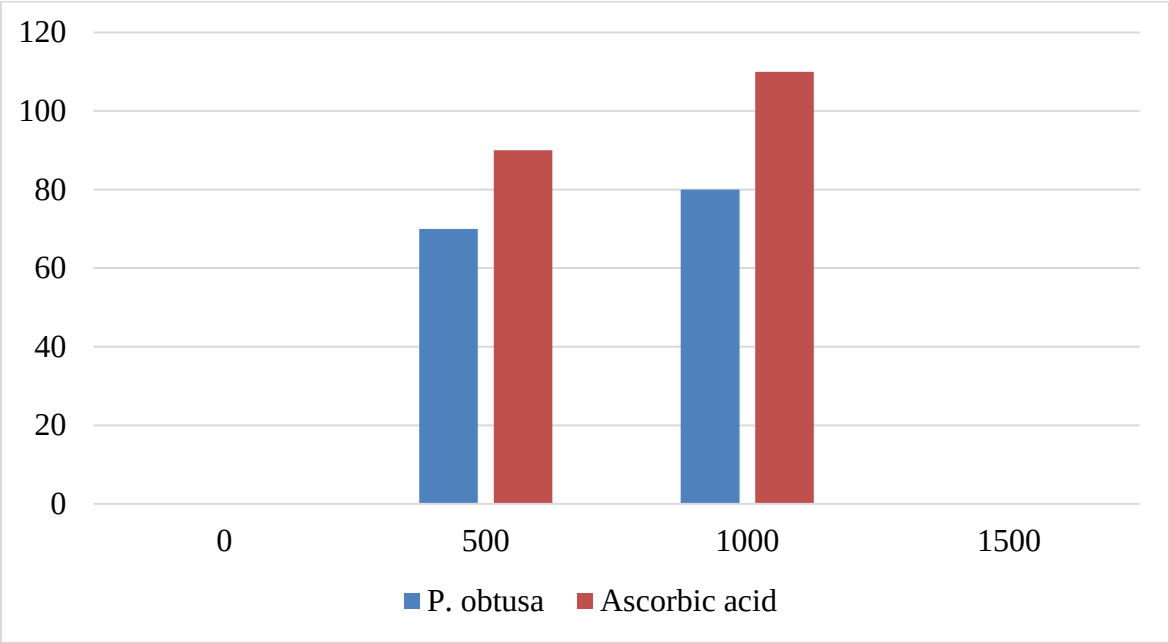

Figure 2: Graphical Representation of DPPH activity of P. obtusa and ascorbic acid.

4.3 ABTS radical scavenging activity

The ABTS scavenging activity of *P. obtusa* and ascorbic acid improves with concentration. At 500 µg/ml, *P. obtusa* shows 55% scavenging activity compared to 80% for ascorbic acid. This increases to 60% for *P. obtusa* at 1000 µg/ml, while ascorbic acid achieves 90% scavenging at the same concentration. No data is available for *P. obtusa* at 1500 µg/ml, but ascorbic acid's activity at this concentration is not reported. These results indicate that *P. obtusa* exhibits significant antioxidant activity, though ascorbic acid demonstrates superior scavenging effectiveness across the tested concentrations.

Table 2. ABTS scavenging activity of P. obtusa with ascorbic acid.

Concentration (µg/ml)	**% ABTS Scavenging activity**	
	P. obtusa	**Ascorbic acid**
0	10	25
500	55	80
1000	60	90
1500	-	-

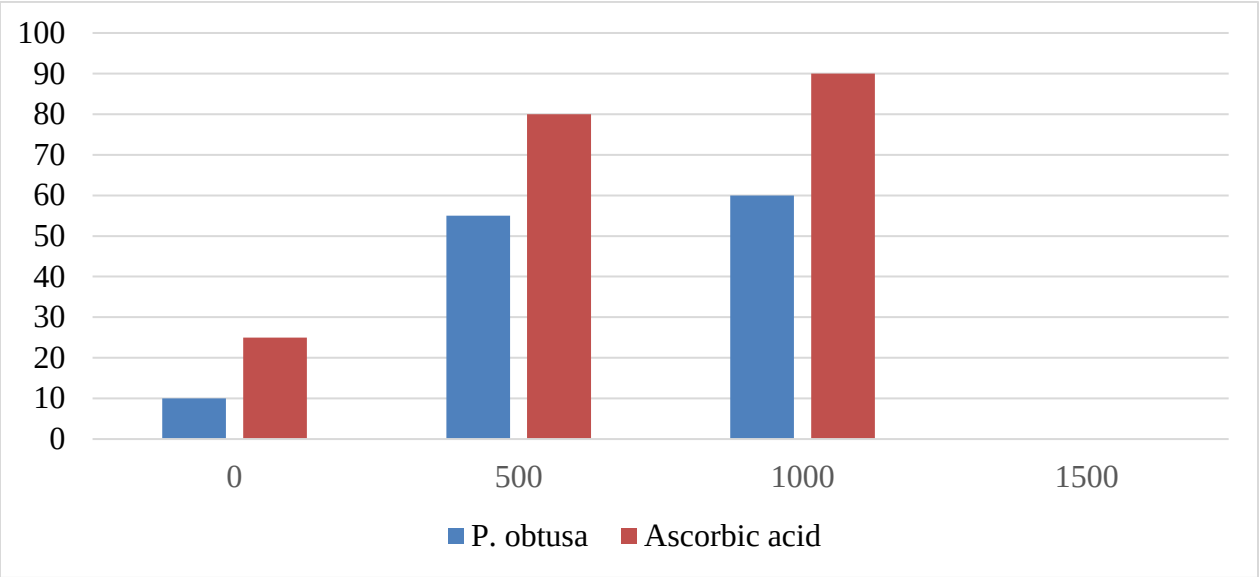

Figure 3: Graphical representation of ABTS scavenging activity of P. obtusa and ascorbic acid.

4. CONCLUSION

According to the study, Plumeria obtusa performs well in both the DPPH and ABTS radical scavenging tests, indicating that it has significant antioxidant qualities. P. obtusa's antioxidant activity responded dose-dependently to concentration, rising with it. P. obtusa specifically demonstrated 60% scavenging activity in the DPPH assay and 55% in the ABTS assay at 500 µg/ml. At 1000 µg/ml, this activity rose to 70% and 60%, respectively. At the same doses, the conventional ascorbic acid had better scavenging properties, achieving 90% and 100% in the DPPH assay and 80% and 90% in the ABTS assay. The results indicate that although P. obtusa exhibits strong antioxidant capacity, its effectiveness is not as great as that of ascorbic acid. This is because P. obtusa is less effective than ascorbic acid, especially at higher concentrations. However, the detected antioxidant activity highlights P. obtusa's medicinal potential as a natural antioxidant source. Given that P. obtusa's efficacy is now lower than that of well-established antioxidants like ascorbic acid, this suggests that P. obtusa is a viable option for further investigation in the development of natural antioxidant therapy.

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