COMPARATIVE ASSESSMENT OF DPPH FREE RADICAL SCAVENGING ACTIVITY BETWEEN INDIAN MEDICINAL PLANT EXTRACTS OF *MANSOA ALLIACEA, KIGELIA AFRICANA, CURCUMA AROMATICA"*

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Abstract

The current study evaluates the DPPH radical scavenging activity of extracts from Mansoa alliacea, Kigelia africana, and Curcuma aromatica, comparing their efficacy with ascorbic acid. The results show a dose-dependent increase in scavenging activity for all extracts, with C.A exhibiting the highest activity (93.21% at 500 µg/mL) and K.A (89.24%). Both extracts approached the performance of ascorbic acid (95.63%). The superior activity of C.A and K.A can be attributed to their rich phytochemical profiles, including curcuminoids and flavonoids. This study highlights the potential of these natural antioxidants in pharmaceutical and nutraceutical industries.

Key words:

***Mansoa alliacea, Kigelia africana, Curcuma aromatic*a, DPPH free radical**

1. Introduction

An imbalance between free radicals and antioxidants results in oxidative stress, a significant contributor to the onset of chronic illnesses, including cancer, cardiovascular disorders, diabetes & neurodegenerative conditions[1]. Antioxidants, both synthetic and natural, playing an important role in reducing oxidative damage, and maintaining cellular homeostasis[2]. However, growing concerns about the safety, toxicity, and side effects of synthetic antioxidants have driven the search for safer, plant-based alternatives[3]. Medicinal plants have long been recognized for their bioactive compounds with strong antioxidant properties[4]. Among these, Mansoa alliacea, Kigelia africana, and Curcuma aromatica hold a prominent place in traditional medicine due to their diverse ethnopharmacological applications[5]. Mansoa alliacea is known for its organosulfur compounds, Kigelia africana for its flavonoids and iridoids, and Curcuma aromatica for its curcuminoids and essential oils, all of which are linked to antioxidant activity[6]. These plants have been widely used for their antimicrobial, anti-inflammatory, and therapeutic properties. The DPPH (2,2-diphenyl-1-picrylhydrazyl) assay is a straightforward and dependable technique for assessing the free radical scavenging potential of plant extracts[7]. While individual studies have highlighted the antioxidant potential of these plants, a comprehensive and comparative analysis of their DPPH scavenging activities remains unexplored[8]. Current study aim to address the research gap by assessing and comparing the antioxidant activities of Mansoa alliacea, Kigelia africana, and Curcuma aromatica, providing valuable insights into their relative efficacy as natural antioxidants.

2. Methodology

2.1 Plant source:

Leaves of *Mansoa alliacea (M.A)*, Fruits of *Kigelia africana (K.A)*, and roots of *Curcuma aromatica* (C.A) from herbal markets were procured, Authentication is done with the help of Retired botanist Dr.D.Ramakanth Raju and specimens are stored in a recognized herbarium of Nirmala College Of Pharmacy, Andhra Pradesh with the Specimen number of S.J-01/024, S.J-02/024, S.J-03/024.

2.2 Preparation of Extracts:

Drying

The plant materials were cleaned to remove dirt and debris, then air-dried or oven-dried at a controlled temperature (e.g., 40–50°C) to preserve phytochemicals[9]. The dried plant material was ground into a fine powder using a mechanical grinder.

Extraction:

Obtained plant material was packed in the Soxhlet body and is extracted using the ethanol for a period of 72 hours individually , after 72 hours of Soxhlet extraction the material was made solvent free using rotaevapourator. Obtained extract was stored in a airtight container at room temperature till further usage.

2.3 DPPH protocol:

Preparation of Reagents

A 0.1 mM DPPH solution was prepared in ethanol and stored in a dark bottle to avoid degradation by light.

Assay Procedure

The plant extracts were diluted to prepare different concentrations (e.g., 100 µg/mL, 200µg/mL, 300, 400, 500 µg/mL). 100 micro liter of each extract concentration was mixed with 1 mL of DPPH solution in a test tube. A blank sample contains 100 micro liter of DPPH and positive controls standard antioxidant such as ascorbic acid was taken. The reaction mixture was allowed to incubate at ambient temperature in the absence of light for 30 minutes. The absorbance was quantified at 517 nm wavelength with a UV-Vis spectrophotometer. The process of reagents addition was represented in Table-1. The process of preparation is done in triplicate and the average values were represented in Table-2.

Table:1 Reagents preparation in various samples

Reagents	Test	Standard	Blank
1,1 diphenyl-2-picryl hydrazyl (DPPH)	100 µL	100 µL	100 µL
Ascorbic acid	--	100 µL	--
Test drugs – M.A (100,200, 300, 400, 500 µg/ml	100 µL	--	--

Test drugs – K.A (100,200, 300, 400, 500 µg/ml	100 µL		
Test drugs – C.A (100,200, 300, 400, 500 µg/ml	100 µL		

Calculation

The percentage of radical scavenging activity was calculated using the formula:

$$\%\text{Inhibition} = \left(\frac{\text{Absorbance of control} - \text{Absorbance of sample}}{\text{Absorbance of control}}\right) \times 100$$

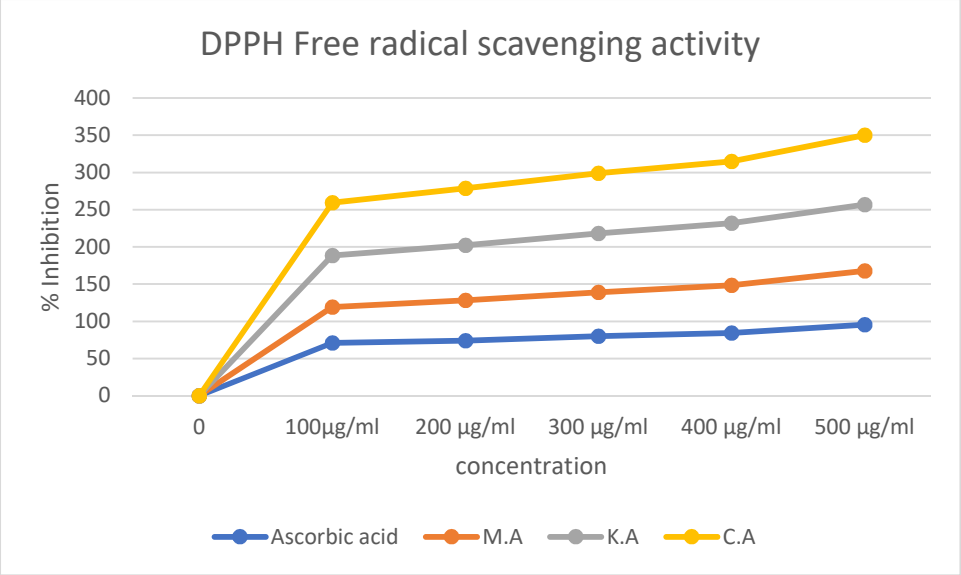
3. Results:

Obtained results were given in Table-2

Table:2 Results of DPPH in various extracts

Samples	**Concentrations in micro gram per ml**				
	100	**200**	**300**	**400**	**500**
Standard (ascorbic acid)	71.24	74.32	80.19	84.41	95.63
M.A	48.21	53.92	58.64	64.19	72.19
K.A	68.87	74.17	79.15	83.21	89.24
C.A	71.21	76.18	81.22	83.23	93.21

Obtained values are average of triplicate



Graph:1 Represent the % inhibition exhibited by the various plants extract towards DPPH free radical ion

4. Discussion:

The study evaluated the DPPH free radical scavenging activity of extracts from *Mansoa alliacea* (M.A), *Kigelia africana* (K.A), and *Curcuma aromatica* (C.A) and compared their performance with the standard antioxidant ascorbic acid. The results revealed differences in scavenging efficiency among the extracts at various concentrations (100–500 µg/mL).

At the lowest concentration (100 µg/mL), *K.A* and *C.A* demonstrated higher scavenging activity (68.87% and 71.21%, respectively) compared to *M.A* (48.21%). The superior activity of *K.A* and *C.A* at this concentration indicates the presence of potent antioxidant compounds in these extracts. The performance of *C.A* was nearly comparable to ascorbic acid (71.24%), highlighting its strong free radical scavenging potential.

As the concentration increased, all the samples showed a dose-dependent increase in scavenging activity. At 300 µg/mL, *M.A* reached 58.64%, while *K.A* and *C.A* showed markedly higher activities at 79.15% and 81.22%, respectively. This further suggests that *K.A* and *C.A* contain more effective free radical scavengers compared to *M.A*.

At the highest concentration (500 µg/mL), the activities of *K.A* (89.24%) and *C.A* (93.21%) were close to that of ascorbic acid (95.63%), with *C.A* approaching the performance of the standard. On the other hand, *M.A* showed relatively lower activity (72.19%), indicating a less potent antioxidant capacity compared to the other two extracts.

The high radical scavenging activity of *C.A* may be attributed to its high content of curcuminoids, which are known for their antioxidant properties[10]. Similarly, the activity of *K.A* could be linked to the presence of flavonoids and iridoids, which are potent free radical

scavengers. The comparatively lower activity of *M.A* suggests that its bioactive components, such as organosulfur compounds, may be less effective in scavenging DPPH radicals[11].

4.1 Comparative Analysis

The results demonstrate that *C.A* exhibited the highest antioxidant potential among the three extracts, closely followed by *K.A*, with *M.A* showing the lowest activity. This aligns with previous studies suggesting that *C.A* and *K.A* are rich in phytochemicals with strong antioxidant properties. The IC50 values for *K.A* and *C.A* are likely to be closer to ascorbic acid, reinforcing their potential as natural antioxidants for pharmaceutical and nutraceutical applications.

4.2 Implications and Future Directions

The findings highlight the potential of *C.A* and *K.A* as promising sources of natural antioxidants. Further studies should focus on identifying and quantifying the specific phytochemicals responsible for the observed activity. Additionally, investigating the extracts' efficacy in biological systems and exploring synergistic effects between their compounds could provide deeper insights into their therapeutic applications[12].

5. **Conclusion**:

Curcuma aromatica (C.A) and Kigelia africana (K.A) show significant antioxidant potential, closely matching ascorbic acid activity at higher concentrations. C.A exhibited the highest radical scavenging activity, while K.A showed strong activity. These findings suggest C.A and K.A as promising natural antioxidants with potential applications in pharmaceutical, nutraceutical, and food industries. Future research should focus on isolating and characterizing bioactive compounds and evaluating their efficacy in in vivo models.

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