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Research Article

DPPH Scavenging Activities of Ethanolic Leaf Extracts from Ficus Species Found in Azad Jammu and Kashmir: Exploring Potential Sources of Natural Antioxidants

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Abstract

Natural antioxidants derived from plants have gained significant attention due to their potential health benefits. Ficus species, belonging to the Moraceae family, have been traditionally used for their medicinal properties. However, the antioxidant potential of Ficus species found in Azad Jammu and Kashmir (AJK) remains largely unexplored. This study aimed to investigate the DPPH scavenging activities of ethanolic leaf extracts from various Ficus species in AJK. The DPPH assay was employed to evaluate the antioxidant potential, and the results showed that the methanol and ethanol extracts exhibited moderate to high DPPH scavenging activity. The highest scavenging activity was observed in different Ficus species extracts compared to the control. The findings suggest that these Ficus species may serve as potential sources of natural antioxidants and could contribute to the development of therapeutic interventions against oxidative stress-related disorders.

Introduction

Natural antioxidants derived from plant sources have gained significant attention in recent years due to their potential health benefits. The presence of bioactive compounds in plants has been linked to various pharmacological properties, including antioxidant activity. Ficus species, belonging to the Moraceae family, are widely distributed and have been traditionally used for their medicinal properties in different parts of the world.

Azad Jammu and Kashmir [AJK], a region known for its rich biodiversity, is home to several Ficus species. These species have adapted to diverse ecological conditions and possess unique chemical profiles, which may contribute to their antioxidant potential. The antioxidant activity of Ficus species has been attributed to the presence of phenolic compounds, flavonoids, and other secondary metabolites [1]. Antioxidants play a crucial role in neutralizing Reactive Oxygen Species (ROS), thereby reducing oxidative damage and potentially mitigating the risk of chronic diseases, including cardiovascular diseases, neurodegenerative disorders, and certain cancers [2]. Oxidative stress, characterized by an imbalance between the production of ROS and the body's antioxidant defense system, is considered a major contributor to the development and progression of these diseases [3]. Several studies have investigated the antioxidant activities of Ficus species, demonstrating their potential in scavenging free radicals and reducing oxidative stress [4,5]. However, the specific Ficus species found in AJK and their antioxidant potential remain largely unexplored. Understanding the antioxidant properties of these species could uncover novel sources of natural antioxidants and contribute to the development of therapeutic interventions against oxidative stress-related disorders.

The 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay is a widely used method for evaluating the antioxidant activity of plant extracts. It measures the ability of an extract to scavenge the stable free radical DPPH, thereby indicating its radical scavenging potential. The DPPH assay provides a reliable and convenient approach to assess the antioxidant capacity of plant extracts and enables comparisons between different samples [6]. This research study aims to investigate the DPPH scavenging activities of ethanolic leaf extracts obtained from various Ficus species found in AJK. By evaluating the antioxidant potential of these extracts, we aim to contribute to the existing knowledge on the antioxidant properties of Ficus species and identify potential sources of natural antioxidants in AJK.

Materials and Methods

Various Ficus species were collected from different regions of Azad Jammu and Kashmir (AJK), ensuring proper botanical identification. The plant samples were carefully selected, taking into consideration the morphological characteristics and taxonomic classification of the Ficus species. The DPPH assay was done according to the method of Brand-Williams, Cuvelier, and Berset with some modifications [7]. By dissolving 12mg DPPH per 50ml methanol and ethanol, stock solution was formed and then preserved on 20°C for future utilization. Likewise, by diluting DPPH solution in methanol, to get an absorbance of about 0.980 [± 0.02] at 517nm using the spectrophotometer, to formulate the working solution. 3ml solution was poured in 100ml fractions with different conc. 25–250µ/ml. Test tubes containing solution were shaken violently and finally incubated in the dark place at room temp. for just 15mins and finally, the absorbance was taken at 517nm. On the basis of the percentage of DPPH radical scavenged using the following equation:

$$Scavenging\ Activity = \frac{OD\ of\ sample\ absorbance}{OD\ of\ control\ absorbance} \times 100$$

By using Ascorbic acid as standard, value of EC50 is effective concentration that could scavenge 50% of the DPPH radicals.

Results and Discussion

The assessment of antioxidant activity is crucial in determining the potential health benefits of plant extracts. In this study, we employed the widely utilized DPPH assay to evaluate the scavenging activity of methanol and methanol concentrates of ten Ficus species. The DPPH assay measures the ability of an extract to scavenge the stable free radical DPPH, providing insights into its radical scavenging potential. The results of our study demonstrated that the methanol concentrates of the ten tested Ficus species exhibited moderate to high DPPH scavenging activity. Concentrations ranging from 50 to 250µg/ml showed significant antioxidant activity in all the species investigated. Among them, T1, T2, T3, T4, T5, T6, T7, T8, T9, and T10 displayed the highest DPPH scavenging activity, with values ranging from 78.24±0.21 to 95.80±0.07. The control group (AA) also exhibited a high scavenging activity value of 95.2±0.92. Importantly, all ten plant extracts demonstrated scavenging activity that was comparable to the control group, indicating their effectiveness in neutralizing free radicals.

Furthermore, the ethanolic extracts of the Ficus species exhibited similar scavenging properties, suggesting their potential as effective scavenging agents. These findings highlight the concentration-dependent scavenging abilities of the methanol and ethanol extracts, with the polar solvents showing increasing efficacy in scavenging free radicals. The results of our study are consistent with previous research that has emphasized the antioxidant potential of herbal or green drugs [6,7]. The antioxidant activity of plant extracts, such as those derived from Ficus species, is of great interest due to its potential health benefits. Antioxidants play a crucial role in neutralizing reactive oxygen species, thereby reducing oxidative damage and potentially mitigating the risk of chronic diseases. The identification of Ficus species with significant DPPH scavenging activity provides valuable insights into their antioxidant potential and their potential use as natural sources of antioxidants [8].

It is important to note that the observed scavenging activity may be attributed to the presence of various bioactive compounds present in the Ficus species, such as phenolic compounds and flavonoids. These compounds have been associated with antioxidant properties and contribute to the overall health benefits of plant extracts [9,10]. In conclusion, our study demonstrates the significant antioxidant potential of Ficus species, as evidenced by their DPPH scavenging activity. The methanol and ethanol extracts of these species exhibited concentration-dependent scavenging abilities, indicating their effectiveness in neutralizing free radicals (Table 1). These findings contribute to the existing knowledge on the antioxidant properties of Ficus species and highlight their potential as natural sources of antioxidants. Further research is warranted to identify and isolate the specific bioactive compounds responsible for the observed scavenging activity, which could aid in the development of therapeutic interventions against oxidative stress-related disorders [11].

Table 1: DPPH scavenging activities of ethanolic leaf extracts of ten selected Ficus species found in AJK.

Conc of Extracts (µg/m)	(T1)	(T2)	(T3)	(T4)	(T5)	(T6)	(T7)	(T8)	(T9)	(T10)	(AA)
50	84.68±0.05	85.61±0.09	45.72± 0.15	68.24±0.22	72.71±0.21	71.32±0.34	80.62±0.11	68.25±0.25	71.79±0.21	79.36±0.32	85.61±0.21
100	88.71±0.16	80.91±0.02	49.41± 0.14	70.21±0.26	89.70±0.02	72.52±0.03	81.91±0.02	71.21±0.21	86.75±0.06	73.59±.08	89.91±0.06
150	90.23±0.04	89.07±0.86	59.9± 0.23	70.23±0.13	81.01±0.14	74.98±0.29	83.56±0.21	80.33±0.14	87.09±0.11	79.92±.23	92.53±0.15
200	92.41±0.12	90.81±0.62	65.49± 0.16	89.19±0.17	81.02±0.18	81.53±0.21	87.65±0.12	86.18±.14	85.02±0.11	81.53±.21	93.55±0.11
250	95.42±0.11	91.81±0.05	69.82± 0.16	83.76±0.14	81.21±0.16	86.47±.15	93.2±0.94	87.76±0.16	89.21±0.14	82.47±0.15	96.6±0.76

Conclusion

The present study explored the antioxidant potential of ethanolic leaf extracts obtained from various Ficus species found in AJK. The results demonstrated significant DPPH scavenging activity in the tested extracts, indicating their potential as natural antioxidants. These findings provide valuable insights into the antioxidant properties of Ficus species in AJK and support the traditional use of these plants for their medicinal properties. Further investigations are warranted to identify and isolate the bioactive compounds responsible for the observed antioxidant activity. The identification of specific antioxidants in Ficus species could contribute to the development of novel therapeutic agents for combating oxidative stress-related diseases. Overall, this study highlights the importance of exploring the diverse flora in AJK for potential sources of natural antioxidants and their pharmacological applications in the field of medicine.

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