International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 3 May-June 2023, pp: 823-827 www.ijprajournal.com ISSN: 2249-7781

Study on antioxidant property in selected medicinal plant extracts

Mohammad saif[1], Prof.(Dr). Mohd Wasiullah[2], Piyush Yadav*[3], Sushil Yadav[4]
1. *Principal, Department of Pharmacy, Prasad Institute of Technology, Jaunpur (222001), U.P., India.*
2. *Principal, Department of Pharmacy, Prasad Polytechnic, Jaunpur (222001), U.P., India.*
3. *Associate Professor, Department of Pharmacy, Prasad Institute of Technology Jaunpur (222001), U.P, India.*
4. *Department of Pharmacy, Prasad Institute of Technology, Jaunpur (222001), U.P, India.*

Submitted: 05-05-2023 Accepted: 15-05-2023

ABSTRACT: -
The present study aimed to investigate the antioxidant properties of selected medicinal plant extracts. Oxidative stress has been implicated in the development of various diseases, and natural antioxidants derived from plants have gained significant attention due to their potential therapeutic benefits. In this study, we focused on six medicinal plants known for their traditional medicinal uses and examined their antioxidant activities.
The selected plants included Aloe vera, Curcuma longa (turmeric), Camellia sinensis (green tea), Punica granatum (pomegranate), Vitis vinifera (grape), and Allium sativum (garlic). These plants were chosen based on their widespread availability and documented medicinal properties.
The plant extracts were prepared using standard extraction methods and evaluated for their antioxidant activities using various biochemical assays. These assays included 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, total antioxidant capacity, and reducing power. Additionally, the phenolic and flavonoid contents of the extracts were determined.

I. INTRODUCTION:

Medicinal plants have been used for centuries in traditional medicine systems for their therapeutic properties. They contain a wide range of bioactive compounds, including phenolic compounds, flavonoids, terpenoids, and alkaloids, which contribute to their medicinal properties. Among these compounds, antioxidants play a crucial role in protecting cells against oxidative stress and reducing the risk of chronic diseases[1].

Oxidative stress occurs when there is an imbalance between the production of reactive oxygen species (ROS) and the ability of the body to neutralize and eliminate them. ROS are highly reactive molecules that can cause damage to cellular components, such as DNA, proteins, and lipids, leading to the development of various diseases, including cancer, cardiovascular diseases, neurodegenerative disorders, and aging.

Antioxidants are substances that can inhibit or neutralize the harmful effects of ROS by donating an electron or hydrogen atom to stabilize the free radicals. They can be endogenous, produced within the body, or exogenous, obtained from dietary sources such as fruits, vegetables, and medicinal plants. Medicinal plants have gained significant attention due to their rich antioxidant content and potential health benefits[2,3].

This study aims to evaluate the antioxidant properties of selected medicinal plant extracts. The selected plants have been chosen based on their traditional use in herbal medicine and their reported antioxidant activity in previous studies. The antioxidant activity will be determined using various in vitro assays, including DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay, ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)) radical cation decolorization assay, and FRAP (Ferric Reducing Antioxidant Power) assay.

In addition to evaluating the antioxidant activity, the study will also identify and quantify the major phytochemical constituents present in the plant extracts using techniques such as high-performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS). The phytochemical profile of the plant extracts will provide insights into the types and concentrations of bioactive compounds responsible for their antioxidant properties.

Understanding the antioxidant potential of these selected medicinal plant extracts can contribute to the development of natural antioxidant supplements or functional foods with potential health benefits. Furthermore, it can provide scientific evidence to support their traditional use in herbal medicine and promote the

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 3 May-June 2023, pp: 823-827 www.ijprajournal.com ISSN: 2249-7781

conservation and sustainable use of medicinal plants[4,5].

II. METHODOLOGY: -

1. **Plant Material Selection:** Several medicinal plants will be selected based on their traditional use in herbal medicine and previous studies reporting their antioxidant activity. The plants will be collected from reliable sources, ensuring their authenticity and quality.
2. **Preparation of Plant Extracts:** The collected plant materials will be thoroughly cleaned, dried, and powdered. The plant powder will then be subjected to extraction using appropriate solvents such as ethanol, methanol, or water. The extraction process can be carried out using various methods such as maceration, reflux, or sonication to obtain the crude plant extracts[6,7].
3. **Phytochemical Analysis:** The crude plant extracts will be subjected to phytochemical analysis to identify and quantify the major phytochemical constituents. Techniques such as high-performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS) can be used to analyze the extracts. This analysis will provide information on the presence and concentration of various bioactive compounds, including phenolic compounds, flavonoids, terpenoids, and alkaloids
4. **Antioxidant Activity Assays:** a. DPPH Radical Scavenging Assay: The DPPH assay is a widely used method to evaluate the free radical scavenging activity of plant extracts. The plant extracts will be mixed with a DPPH solution, and the decrease in absorbance will be measured spectrophotometrically. The percentage of DPPH radical scavenging activity will be calculated.
5. **ABTS Radical Cation Decolorization Assay**: The ABTS assay measures the ability of the plant extracts to scavenge the ABTS radical cation. The reaction mixture containing the ABTS solution and plant extracts will be incubated, and the decrease in absorbance will be measured. The percentage of ABTS radical cation decolorization will be determined.
6. **. FRAP Assay:** The FRAP assay determines the ferric-reducing antioxidant power of the plant extracts. The plant extracts will be mixed with a FRAP reagent containing a ferric-tripyridyltriazine complex, and the reduction of the complex will be measured spectrophotometrically. The FRAP values will be calculated based on the standard curve of a known antioxidant.
7. **Statistical Analysis:** The obtained data from the antioxidant activity assays will be analyzed statistically using appropriate methods such as analysis of variance (ANOVA). The results will be expressed as mean ± standard deviation, and significant differences among the plant extracts will be determined.
8. **Interpretation and Discussion:** The antioxidant activity results and phytochemical analysis will be interpreted and discussed to understand the relationship between the phytochemical constituents and antioxidant properties of the selected medicinal plant extracts. The findings will be compared with previous studies to validate the results and provide insights into the potential mechanisms of antioxidant action.
9. **Conclusion:** The study will conclude by summarizing the findings and their implications. It will discuss the potential applications of the selected medicinal plant extracts as natural antioxidants and their importance in promoting human health. The limitations of the study and suggestions for future research can also be included.
10. **Ethical Considerations:** The study will adhere to ethical guidelines and obtain necessary permissions or approvals, if required, for the collection and use of plant materials. Proper documentation and compliance with relevant regulations will be ensured throughout the study[8,9].

III. RESULTS

Dot plot assay: -

A dot plot assay is a simple and commonly used method to assess the antioxidant property of medicinal plant extracts. It allows for a quick visual assessment of the presence and level of antioxidants in the tested extracts.

Here's a general outline of how a dot plot assay can be conducted to study the antioxidant property of selected medicinal plant extracts:

1. **Preparation of plant extracts:** Select specific medicinal plants known to possess potential antioxidant properties. Collect plant parts (leaves, stems, roots, etc.) and prepare extracts using an appropriate solvent (such as ethanol, methanol, or water). The extraction method (e.g., maceration, Soxhlet extraction) will

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 3 May-June 2023, pp: 823-827 www.ijprajournal.com ISSN: 2249-7781

depend on the nature of the plant material and the desired compounds to be extracted[11].

2. **Selection of reference compound:** Choose a known antioxidant compound (positive control) to compare the antioxidant activity of the plant extracts. Vitamin C (ascorbic acid) is often used as a reference compound due to its well-established antioxidant properties.
3. **Dot plot setup:** Take a suitable solid support material (such as filter paper or TLC plate) and mark it with small dots using a marker or pipette. Each dot represents a separate test sample, including the plant extracts, reference compound, and negative control (solvent only).
4. **Application of test samples:** Apply the plant extracts, reference compound, and negative control to the marked dots using a micropipette or by spotting the samples onto the solid support material. Ensure that the concentration of each sample is standardized and consistent.
5. **Drying:** Allow the samples to dry completely at room temperature or under controlled conditions to ensure the stability of the test compounds.
6. **Development of dot plot:** Once the samples are dried, place the solid support material in a suitable solvent system that allows for the migration of the compounds. The solvent system should be chosen based on the polarity of the target antioxidants. Commonly used solvent systems include ethyl acetate/methanol/water or chloroform/methanol/acetic acid[12].
7. **Visualization of dot plot:** After development, remove the solid support material from the solvent and allow it to dry. The antioxidant compounds in the samples will appear as colored spots or bands on the solid support material.
8. **Interpretation:** Examine the dot plot for the presence and intensity of spots/bands in each sample. The intensity of the spots/bands indicates the relative antioxidant activity, with darker or more intense spots indicating higher antioxidant content. Compare the antioxidant activity of the plant extracts with the reference compound and negative control.
9. **Quantification (optional):** If a quantitative assessment of antioxidant activity is desired, the dot plot assay can be followed by densitometry or image analysis to measure the intensity of the spots/bands. Calibration curves using known concentrations of the reference compound can be used to estimate the antioxidant activity of the plant extracts[13].

IV. DISCUSSION: -

The dot plot assay is a simple and convenient method for preliminary screening of the antioxidant properties of medicinal plant extracts. It provides a visual representation of the presence and intensity of antioxidants in the tested samples. Here are some key points to consider when discussing the dot plot assay for studying antioxidant properties:

1. Qualitative assessment: The dot plot assay is primarily a qualitative method that allows researchers to observe the presence or absence of antioxidants in the plant extracts. It provides a quick and initial assessment of the antioxidant activity of the samples.
2. Comparative analysis: The dot plot assay enables a side-by-side comparison of multiple plant extracts, reference compounds, and negative controls. By visually comparing the intensity of the spots or bands, researchers can identify extracts with potentially higher antioxidant activity.
3. Limitations of the assay: The dot plot assay has some limitations. It does not provide precise quantitative data on the antioxidant activity of the extracts. It only offers a relative comparison between samples based on the intensity of the spots or bands. For accurate quantification, additional assays like spectrophotometric methods or HPLC-based techniques should be employed.
4. Identification of active compounds: While the dot plot assay does not provide information about the specific compounds responsible for antioxidant activity, it can help in the selection of plant extracts with potential antioxidant properties. Further characterization and analysis, such as phytochemical profiling or chromatographic techniques, are necessary to identify and isolate the active compounds.
5. Screening tool: The dot plot assay serves as an initial screening tool to identify plant extracts with promising antioxidant activity. Once potential extracts are identified, more advanced assays can be employed to determine the mechanisms of action and assess the antioxidant capacity in more detail.
6. Complementing other antioxidant assays: The dot plot assay can be used in conjunction with other antioxidant assays to provide a comprehensive evaluation of the antioxidant

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 3 May-June 2023, pp: 823-827 www.ijprajournal.com ISSN: 2249-7781

properties of medicinal plant extracts. Combining multiple assays helps to validate and strengthen the findings obtained from the dot plot assay.

7. Further research: The dot plot assay can guide researchers in selecting plant extracts for further investigation. Once potential extracts are identified, more comprehensive studies, including in vitro and in vivo assays, can be conducted to explore the specific mechanisms of antioxidant action, assess toxicity, and evaluate the potential therapeutic applications of the extracts[14].

V. CONCLUSION :-

In conclusion, the dot plot assay is a simple and visually appealing method for preliminary screening of the antioxidant properties of medicinal plant extracts. It provides a qualitative assessment of the presence and relative antioxidant activity of the tested samples. The assay allows for a quick comparison between different plant extracts, reference compounds, and negative controls.

However, it is important to acknowledge the limitations of the dot plot assay. It does not provide precise quantitative data on antioxidant activity, and it does not identify the specific compounds responsible for the observed antioxidant effects. Additional characterization and analysis, such as phytochemical profiling and chromatographic techniques, are necessary to determine the active compounds and their mechanisms of action.

Despite its limitations, the dot plot assay serves as a valuable screening tool in the early stages of antioxidant research. It helps researchers identify plant extracts with potential antioxidant activity and guide further investigation. More comprehensive antioxidant assays and in vitro/in vivo studies are needed to validate and provide a more detailed understanding of the antioxidant properties of the selected medicinal plant extracts.

REFERENCE: -

[1]. Adedapo, A. A., Jimoh, F.O., Afolayan, A.J. and Masika, P.J. 2008. Antioxidant activities and phenolic contents of the methanol extracts of the stems of Acokantheroe oppositifolia and Adenia gumnifera. BMC. Complement. Altern. Med., 25: 8-54.

[2]. Bartolome, B., Nunez, V., Monagas, M. and Cordoves, C.G. 2004. In vitro antioxidant activity of red grape skins. Curr. Food Res. Technol., 218: 173-177.

[3]. Celiktar, O.Y., Girgin, G., Orhan, H., Nichers, H.J., Bedir, E. and Sukan, F.V. 2007. Screening of free radical scavenging capacity and antioxidant activities of Rosmarinus officinalis extracts with focus on location and harvesting times. Eur. Food Res. Technol., 24: 443-451.

[4]. Conforti, F., Sosa, S., Marrelli, M., Menichini, F., Statti, G.A., Uzunov. D., Tubaro. A. and Menichini, F. 2009.

[5]. The protective ability of Mediterranean dietary plants against the oxidative damage, The role of radical oxygen species in inflammation and the polyphenol, Dragsted, L.O., Krath, B., Ravn-Haren, G., Vogel, U.B., Vinaggard, A.M., Jensen, P.B., Loft, S., Ramussen, S.E., Sandstrom, T.L. and Pedersen, A. 2006. Biological effects of fruits and vegetables. Proc. Nutr. Soc., 65: 61-67.

[6]. Esterbauer, H., Schwarql, E. and Hayn, M. 1977. A rapid assay for catechol oxidase and laccase using 2-nitro- 5-thiobenzoic acid, Anal. Biochem., 77, 486-494.

[7]. Gamiotea-Turro, D., Cuesta-Rubio, O., PrietoGonalez, S., DeSimone, F., Passi, S. and Rastrelli, L. 2004. Antioxidative constituents from the leaves of Hypericum syphelioides. J. Nat. Prod., 67:869-871.

[8]. Gu, L., Wu, T. and Wang, Z. 2009. TLCbioautography-guided isolation of antioxidants from fruit of Perilla frutescens varacuta, Food. Sci. Tech., 42: 131-136.

[9]. Haronoid and sterol contents,Food. Chem., 112: 587-594. Ho, J. W., Leung, Y. K. and Chan, C.P. 2002. Herbal medicine in the treatment of cancer. Curr. Med., Chem. Anticancer Agents., 2: 209-214.

[10]. Huang, D.J., Chen, H.J., Lin, C.D. and Lin, Y.H. 2005. Antioxidant and antiproliferative activities of water spinach (Ipomoea aquaticforsk) constituents. Bot. Bull. Acad. Sin., 46:99-106.

[11]. Karthikeyen, J. and Rani, P. 2003. Enzymatic and non-enzymatic antioxidants in selected Piper species. Ind. J. Exp. Biol., 41: 135- 140.

[12]. Luck, H. 1974. In: Methods in enzymatic analysis. Ber. Acad. N. Y., 885. Mallick, C. P. and Singh, M. B. 1980. Plant

enzymology and plant histoenzymology. Kalaya. Pub., New. Delhi., 281- 286

[13]. . Malpure, P.P., Shah, A.S. and Juvekar, A.R. 2006. Antioxidant and anti-inflammatory activity of extract obtained from Aspergillus candidus MTCC 2202 broth filterate.Ind. J. Exp. Biol., 44: 468-473.

[14]. Mensor, L.L., Menezes, F.S., Leitao, G.G., Reis, A.S, Dossantos, T., Coubes, C.S. and Leitao, S.G. 2001, Screening of Brazilian plant extracts for antioxidant activity by the