Phytochemical profiling of two wild unexplored flowers of India

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Abstract

Aristolochia indica and *Dioscorea bulbifera* are two plant species traditionally used in folk medicine for various ailments. Despite their widespread use, the phytochemical composition of flowers of these plants remains poorly understood. Present study aimed to investigate the bioactive compounds present in the flowers of *A. indica* and *D. bulbifera* using hydroethanolic extraction and phytochemical screening. The results revealed the presence of tannins, saponins, and phenolic compounds in both plant extracts, with *A. indica* flowers also containing reducing sugars. These findings provide valuable insights into the phytochemical composition of these plants and suggest their potential for use in the development of natural remedies.

Keywords: Wild flowers, phytochemistry, pharmacology

INTRODUCTION

Plants have been an integral part of human life since ancient times, serving as a source of food, medicine, shelter, and spiritual inspiration (Kumar, 2022; Kumar *et al.,* 2022; Manjula *et al.,* 2022; Mety *et al.,* 2023; Nayak and Kumar, 2023; Sinha *et al.,* 2023; Kumar *et al.,* 2023; Mety *et al.,* 2023; Dimri *et al.,* 2023; Singh and Kumar, 2024; Vimala *et al.,* 2024; Sharma *et al.,* 2024; Dimri *et al.,* 2024). The use of plants for medicinal purposes dates back to ancient civilizations, with evidence of plant-based remedies found in traditional systems of medicine such as Ayurveda, Unani, and Chinese medicine (Sinha *et al.,* 2024; Sethi *et al.,* 2024). Despite the advent of modern medicine, plants continue to play a vital role in healthcare, with many modern medicines derived from plant sources (Basole *et al.,* 2024; Jaiswal *et al.,* 2024). *Aristolochia indica* (Fig. 2) and *Dioscorea bulbifera* (Fig. 1) are two wild

plant species that have been used in traditional medicine for various ailments (Mathew *et al.,* 2011; Kumar *et al.,* 2012; Kumar *et al.,* 2021; Agarwal *et al.,* 2023). *A. indica*, commonly known as Indian birthwort, is a perennial climber used in Ayurvedic medicine to treat fever, rheumatism, and snake bites (Mathew *et al.,* 2011; Bhattacharjee and Bhattacharyya, 2013). *D. bulbifera*, also known as air potato, is a perennial vine used in traditional medicine to treat various conditions, including skin infections and birth control agents (Kumar *et al.,* 2012; Kumar *et al.,* 2013). Despite their widespread use in traditional medicine, the phytochemical composition of *A. indica* and *D. bulbifera* remains poorly understood. Phytochemical screening is a crucial step in the discovery of new medicinal plants, as it helps to identify the bioactive compounds responsible for their therapeutic effects (Kumar and Jena, 2017; Kumar *et al.,* 2017; Mohanty *et al.,* 2021; Swain *et al.,* 2022). Understanding the phytochemical composition of these plants can provide valuable insights into their potential for use in the development of new medicines. The present study aims to investigate the phytochemical composition of *A. indica* and *D. bulbifera* flowers using hydroethanolic extraction and phytochemical screening. The study will provide valuable information on the bioactive compounds present in these plants, which can be used to develop new medicines and healthcare products.

MATERIALS AND METHODS

The flowers of *A. indica* and *D. bulbifera* were collected from Sundargarh district in September 2024. Hydroethanolic extract (50 % ethanol & 50 % distilled water) of flowers were obtained and nine different bioactive compounds were detected using standard methods (Devi *et al.,* 2023; Marndi *et al.,* 2024).

Qualitative phytochemical analysis for secondary metabolites

Test for tannin: 2-5 drops of 0.1 % lead acetate solution were added to 1 ml of the filtrate of the leaf extract. The white gelatinous precipitate provided a positive result for the presence of tannins.

Test for saponin: 1 ml of distilled water was added to 1 ml of the filtrate of the leaf extract and shaken vigorously. The persistent froth formation after shaking indicated the presence of saponin.

Test for flavonoids: 2 ml of 2 % NaOH solution and 3 drops of dilute HCl were added to 1 ml of the filtrate of the leaf extract. The colour of the filtrate initially turned to an intense yellow colour with NaOH solution and later turned colourless. This colour change confirmed the presence of flavonoids.

Test for terpenoids: 1 ml of the filtrate of leaf extract was added with 6 drops of chloroform and placed in the water bath for a few minutes. Then 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids.

Test for phenolic compounds: 1 ml of the filtrate of leaf extract was taken and a few drops of 5 % Ferric chloride solution were added. The bluish-black colour provided a positive result of the phenolic compounds.

Test for reducing sugars: 1 ml of the filtrate of leaf extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept in the water bath for a few minutes. The presence of red-orange precipitate confirmed the presence of reducing sugars.

Test for steroids: 1 ml of the filtrate of the leaf extract was added with 1 ml of chloroform and 1 ml of concentrated H_2SO_4 was added to it. The appearance of upper red and lower yellow with green fluorescence provided the positive result of the test for steroids.

Test for alkaloids: 1 ml of the filtrate of the leaf extract was taken and 3-4 drops of Dragendroff's reagent was added to it. The formation of a reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds: 1 ml of the filtrate of the leaf extract was taken and 3-4 drops of 2,4-Di-nitrophenylhydrazine reagent was added to it. The formation of yellow crystals confirmed the presence of carbonyl compounds.

RESULTS AND DISCUSSION

The phytochemical screening of aqueous-ethanolic extracts of *A. indica* and *D. bulbifera* flowers revealed the presence of several bioactive compounds. Both plant extracts were found to contain tannins, saponins, and phenolic compounds, indicating their potential antioxidant and antimicrobial properties (Table 1). *A. indica* flowers were also found to contain reducing sugars, which was not observed in *D. bulbifera* flowers. This difference in composition may be indicative of distinct biological activities and potential uses of the two plants. Notably, neither extract contained flavonoids, terpenoids, steroids, or alkaloids. The absence of these compounds suggests that the bioactive properties of *A. indica* and *D. bulbifera* flowers may be attributed to the presence of tannins, saponins, and phenolic compounds. Further studies are needed to fully elucidate the biological activities and potential applications of these plants.

Table 1: Phytochemical screening of hydroethanolic extract of *A. indica* and *D. bulbifera* flowers

Bioactive compounds	*A. indica* flowers	*D. bulbifera* flowers
Tannin	+ve	+ve
Saponin	+ve	+ve
Flavonoids	-ve	-ve
Terpenoids	-ve	-ve
Phenolic compounds	+ve	+ve
Reducing sugar	+ve	-ve
Steroids	-ve	-ve
Alkaloids	-ve	-ve

(+ve: positive; -ve: negative)



Fig. 1: Flowers of *D. bulbifera*



Fig. 2: Flowers of *A. indica*

The phytochemical screening of *A. indica* and *D. bulbifera* flowers revealed the presence of tannins, saponins, and phenolic compounds, which are known for their antioxidant, anti-inflammatory, and antimicrobial properties. The presence of these

bioactive compounds suggests that the flowers of these plants may have potential therapeutic applications, such as treating oxidative stress-related disorders, inflammation, and infections. The differences in phytochemical composition between the two plants also highlight the importance of further studies to fully elucidate their bioactive properties and potential uses. Future studies will focus on isolating and characterizing the bioactive compounds present in *A. indica* and *D. bulbifera* flowers, as well as evaluating their pharmacological activities using in vitro and in vivo models. Additionally, further research will be conducted to explore the potential uses of these plants in traditional medicine, including their efficacy and safety in treating various ailments. The findings of this study provide a foundation for further research and development of new medicines and healthcare products from these plants, which could contribute to the improvement of human health and well-being.

CONCLUSION

In conclusion, the phytochemical screening of *A. indica* and *D. bulbifera* flowers revealed the presence of bioactive compounds with potential therapeutic applications. The study highlights the importance of exploring traditional medicinal plants for their phytochemical composition and pharmacological activities. The findings of this study provide a foundation for further research and development of new medicines and healthcare products from these plants, which could contribute to the improvement of human health and well-being, and underscore the need for conservation and sustainable use of these valuable plant resources.

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