SHORT COMMUNICATION

Biochemical, Phytochemical Screening and Pharmacological Potential of *Allamanda blanchetii* (Purple Allamanda)

Pratik Dokhe[1], Swapnil Girme[1], Mukul M. Barawant[1*], Gholamreza Abdi[2]

DOI: 10.18811/ijpen.v9i01.15

Abstract

One of the significant members of the perennial, terrestrial plant family Apocynaceae is *Allamanda blanchetii*. Its gorgeous blossom has led to its cultivation as an ornamental plant. Many ailments can be cured using medicinal herbs. We have presented the preliminary analysis of *A. blanchetii* in this work. In this work, we have provided a phytochemical analysis of *A. blanchetii*, which may suggest that it has therapeutic potential. The chloroform, acetone, and methanol leaf extract has been demonstrated to contain flavonoids, saponins, terpenoids, and tannins. We also research *A. blanchetii* biological makeup. Three different chlorophyll concentrations are shown: total chlorophyll (4.90 mg/g tissue), chlorophyll a (2.78 mg/g tissue), and chlorophyll b (2.71 mg/g tissue). carbs (35.30%), protein (23.5%), and fat (3.5%). While using thin layer chromatography (TLC) to detect different chemical compositions, the results revealed that the Rf value was 0.56 and that the colour band was yellowish. by adopting the AOAC standard technique, it is possible to study the pharmacological potential using variables such as moisture content, ash value, and extractive value in alcohol and water. The results show that there is 78.96% moisture content, 21.03% ash value, 30.40% extractive value in water, and 40.30% alcohol. The study's findings indicate that *A. blanchetii* has therapeutic qualities and is useful for human society.

Keywords: Phytochemical study, Biochemical study, Pharmacological study, Purple Allamanda, Nutritional potential

International Journal of Plant and Environment (2023); **ISSN:** 2454-1117 (Print), 2455-202X (Online)

Introduction

Allamanda violacea & A. cathartica Linn has been reported to show that even decorative blooms have potential antibacterial chemicals that may be of considerable utility for creating plant-based medications.(Joselin, *et al,*. 2012). The bulk of applications still require the use of conventional analytical techniques, despite the fact that there are currently instrumental methodologies for assessing the chemical composition of numerous substances. Currently used typical analytical techniques include gravimetry and titrimetry. The majority of applications still require the use of conventional analysis methods, despite the fact that there are currently instrumental methodologies for analyzing the chemical composition of various substances. Currently used typical analytical techniques include gravimetry and titrimetry (Okoduwa *et al.,* 2015*)*.

Extract from *A. cathartica* Linn. Proteins, carbohydrates, phenolic compounds, phytosterols, flavonoids, quinones, terpenoids, steroids, saponins, glycosides, and alkaloids were among the phyto-constituents in *A. violacea*. Both the extraction method's solvent and the flowers' physiological traits influenced the phytoconstituent's presence or absence. (Joselin, *et al.,* 2012). *A. blanchetii* A. DC. is a decorative plant from the *Allamanda* genus in the Apocynaceae family, sometimes known as purple allamanda.If eaten, the plant's entire composition is fatal. Widespread ornamental cultivation of *A. blanchetii* is practiced. Prior to now, the substances plumericin, isoplumericin, and 5, 6-dimethoxycoumarin were isolated using *A. blanchetii* (unckalin). The roots also contain a number of powerful phytochemicals that have been found. *A. blanchetii* growing in Bangladesh was tested for the first time for its antioxidant, cytotoxic, thrombolytic, membrane-stabilizing, and antimicrobial properties as part of our ongoing investigation into the therapeutic properties of Bangladeshi medicinal plants. Here, we provide the data of our initial research.

[1]Department of Botany, Sanjivani Arts Commerce and Science College Kopargaon, Ahmednagar, Maharashtra, India.

[2]Department of Biotechnology, Persian Gulf Research Institute, Persian Gulf University, Bushehr, Iran.

***Corresponding author:** Mukul M. Barawant, Department of Botany, Sanjivani Arts Commerce and Science College Kopargaon, Ahmednagar, Maharashtra, India, Email: mukulbarwant97@gmail.com

How to cite this article: Dokhe, P., Girme, S., Barawant, M.M., Abdi, G. (2023). Biochemical, Phytochemical Screening and Pharmacological Potential of *Allamanda blanchetii* (Purple Allamanda). International Journal of Plant and Environment. 9(1), 89-92.

Conflict of interest: None

Submitted: 08/01/2023 **Accepted:** 22/02/2023 **Published:** 30/03/2023

Unprocessed extracts of flowers and roots include a variety of phytochemicals that are known to have medical applications. The phytochemistry of plants has recently been the subject of numerous investigations worldwide. The Apocynaceae family of decorative flowers was selected for this study's phytochemical screening. This family's various species have been used for many different things throughout history. Many species are also widely planted for ornamental purposes. The Apocynaceae family has a number of important medicinal plants with interesting phytochemical constituents and a range of biological activities. (Wong *et al,*.2011, Keawpradub, *et al,*.1999 and Ponni *et al,*.2009) *A cathartica,*. SeNPs were produced using the green synthesis of L. flower extract, which has enormous promise in agriculture. Its bloom includes flavonoid chemicals such as kaempferol, hesperetin, and quercetin, a potent reducing agent. (Sarkar & Kalita 2022). The entire plant of *A. cathartica* contains plumieride, plumericin, and allamandin in addition to other crucial

phytochemicals. Ursolic acid, ß-sitosterol, ß-amyrin, plumericin, sesquiterpenes, and plumieride are the chemical components of leaves that have been isolated and identified. Stem and bark also include triterpenoids, glucoside, and alkaloids in addition to the aforementioned. While roots are abundant in triterpenoids, plumieride, alkaloid, and glucoside, flowers are rich in kaempferol, quercetin, and other flavonoid components. The entire plant demonstrates ethnopharmacological characteristics. Laxatives, antibiotics, treatments for malaria, jaundice, an enlarging spleen, coughing, anti-inflammatory, purgative, and antioxidant qualities are a few examples. Sap has cancer-fighting and antimicrobial qualities (Pamidimukkala *et al.,* 2021). The common names "Yellow Allamanda," "Golden Trumpet," and "Liane à lait" all refer to *A. cathartica*. All of parts are rich in secondary metabolites, and its leaves, flowers, roots, and stems are utilised in traditional medicine. The distribution of 151 compounds was as follows: 3 hydrocarbons are found in flowers, and extracts of flowers, leaves, and stems contain 7 alcohol molecules, 9 esters, 1 ether, 6 aldehydes, and 1 ketone. 37 fatty acids and phospholipids; 43 volatile substances, mainly in the flowers and leaves; 5 phenolic substances and 6 flavonoids in the flowers and stems; 2 alkaloids in the stems; 11 steroids and terpenes in the leaves, stems, and flowers; and 14 lactones in the roots, stems, leaves, flowers, and bark; and 6 carbohydrates in the leaves, stems, and nectar of the substances(Matignon *et al*., 2023). The entire plant of *A. cathartica* contains plumieride, plumericin, and allamandin in addition to other crucial phytochemicals. Ursolic acid, ß-sitosterol, ß-amyrin, plumericin, sesquiterpenes, and plumieride are the chemical components of leaves that have been isolated and identified. Stem and bark also include triterpenoids, glucoside, and alkaloids in addition to the aforementioned. While roots are abundant in triterpenoids, plumieride, alkaloid, and glucoside, flowers are rich in kaempferol, quercetin, and other flavonoid components. The entire plant demonstrates ethnopharmacological characteristics. Laxatives, antibiotics, treatments for malaria, jaundice, an enlarging spleen, coughing, anti-inflammatory, purgative, and antioxidant qualities are a few examples. Sap has cancer-fighting and antimicrobial qualities (Pamidimukkala *et al.,* 2021). *Allamanda* varieties like *A. blanchetti* and *A. violacea* are included in the Apocynaceae family. It is a common shrub in Indian gardens that stands upright, is evergreen, and grows to a maximum height of 4 metres. The plant cannot tolerate shade, saline soil, or alkaline conditions. They are quite susceptible to freezing. The Apocyanaceae plant *A. cathartica* L. is also known as Yellow Bell and Angel's trumpet. It is native to the Central, South, and West Indies. It is widespread across the tropics. It can be found in many places in Central, Eastern, Southern, and Southern India, as well as the Andaman Islands. We make use of the entire plant, including the milky fluid, roots, branches, leaves, blooms, and flowers. Antimicrobial presence and activity have been observed for (Agbebi *et al.,* 2022).

Materials and Methods

Collection of Plant Materials

In Yeola, Maharashtra, fresh leaves were gathered from *A. blacheti* (purple Allamanda) Fig. 1. Dust and other pollutants were removed with the use of tap water and dried in the sun. Then, after being reduced to a fine powder, the leaves were serially extracted using a variety of solvents, including water, alcohol, acetone, and ether, according to their increasing polarity.

Preparation of extract

Water

In order to extract a variety of polar molecules, it is utilized as the most polar solvent. Advantages. It is extremely polar, inexpensive, and harmless and dissolves a variety of compounds. Disadvantages. It may induce hydrolysis, promote the development of germs and mold, and require a lot of heat to concentrate the extract.

Alcohol

Moreover, it may extract polar secondary metabolites and has a polar characteristic. It is also miscible with water. Advantages. More than 20% of a concentration causes it to become self-preservative. Just a little heat is required to concentrate the extract, and low amounts are safe. Disadvantages. It burns easily and quickly and doesn't dissolve wax, gums, or fats.

Ether

Fatty acids, terpenoids, alkaloids, and coumarins may all be extracted with the aid of this nonpolar solvent. Advantages. It has no flavor, a low boiling point, and is miscible with water. It also exhibits low instability and does not react with metals, acids, or bases. Disadvantages. It has a considerable degree of flammability and volatility.

Acetone

Acetone was chosen as an extractant for bioassay work due to its efficacy in terms of quantity and diversity of chemicals extracted, simplicity of removal, safety, and very low toxicity to test organisms (Eloff, 1998a). Each species' dried powdered leaves were extracted individually using 40 ml of scientific-grade Merck acetone and 4g of finely chopped *A. blacheti* plant leaves in polyester centrifuge tubes. Tubes were violently shaken for 30 minutes in a Labotec model 20.2 shaking machine that was operating at high speed. The supernatant was centrifuged at 3500 rpm for 10 minutes before being decanted into pre-weighed, labeled containers. The marc was taken out three more times. The solvent was taken out and allowed to warm up in a fume cabinet before being measured.

Fig 1: Plant of *A. Blanchetii* (purple Allamanda)

Phytochemical Study

According to established standard procedures, preliminary phytochemical analyses of various extracts of *A. blacheti* Linn were carried out for the presence of major constituent classes such as alkaloids, carbohydrates, flavonoids, protein, amino acids, Saponins, glycosides, steroids, tannins, Terpinoids, and phenolic compounds. (Kirtikar, & Basu, 1994 , Harbone JB 1984 and 1988).

Biochemical study

Several biochemical parameters, such as the carbohydrate (Dubois *et al.,* 1956), protein (Lowry *et al.,* 1951), lipid (Bligh, and Dyer, 1959), and chlorophyll content, were studied in accordance with a standard technique (Arnon, 1949).

Result and Discussion

A. blancheti phytochemical analysis followed the established procedure described in the methodology. The phytochemical screening has been conducted in a similar manner.

The screening revealed that alkaloids, glycosides, triterpenes, carbohydrates, flavonoids, and steroids were present in the ethanol extract of G. applanatum. The major screening revealed the presence of alkaloids, cardiac glycosides, triterpenes, carbohydrate, flavonoids, and steroids in the aqueous extract of G. applanatum. (Hossen *et al.,* 2021) Alkaloids, amino acids, flavonoids, glycosides, proteins, reducing sugars, starches, steroids, tannins, and terpenoids are detected, according to Table 1 of the phytochemical screening results. The principal classes of components including alkaloids, carbohydrates, protein, amino acids, Terpinoids, Saponins, glycosides, steroids, tannins, flavonoids, and phenolic compounds were examined in preliminary phytochemical analyses of several extracts of *A. cathartica* Linn. Our findings demonstrate the presence of

Table 1: Phytochemical study of *A. blanchetii*

Sr. No	*Parameter*	*Alcohol*	*Aqueous*	*Acetone*	*Ether*
1	Alkaloid	+++	++	+++	+
2	Phlobatanin	+++	+	++	++
3	Steroid	++	+++	+++	+
4	Quinone	++	+++	++	+
5	Saponin	+++	++	+++	+
6	Tannin	+++	++	++	+
7	Glycoside	-	-	-	-

(+++ More, ++ less, -Absent)

Table 2: Biochemical study of *A. blanchetii*

Sr No	*Parameter*	*Result*
1	Carbohydrate	35.30%
2	lipid	3.5%
3	Protein	23.5%
4	Chlorophyll-a	2.78 mg/g tissue
5	Chlorophyll-b	2.71 mg/g tissue
6	Total Chlorophyll	4.90 mg/g tissue
7	TLC	RF-0.76

Table 3: Pharmacological study of *A. blanchetii*

Sr. No	*Parameter*	*Result*
1	Moisture content	78.96%
2	Ash value	21.03%
3	Extractive value in water	30.40%
4	Alcohol	40.30%

alkaloids, phenobatanins, steroids, quinones, saponins, tannins, and glycosides in various extracts, including those listed in Table 1 for alcohol, aqueous, and acetone ether. The chemical profile of a plant's utilised in medicine and therapeutic properties must be represented through biochemical investigation. As a result, we found that the biochemical study indicated in Table 2 was consistent with earlier research. It was carried out to profile the proteins.Total chlorophyll concentration (267 34.3 g/g), chlorophyll a (161 24.9 g/g), (Hameed *et al.,* 2014). While Pharmacogenetics study has been done mentioned in Table 3.

Conclusion

It has been determined that *A. blancheti* serves both a nutritional and therapeutic purpose. Our study revealed that *A. blancheti* for some significant phytochemical, pharmacological, and biochemical components We have presented the preliminary analysis of *A. blanchetii* in this work. We have provided a phytochemical analysis of *A. blanchetii* in this work, which may suggest that it has therapeutic potential

Acknowledgment

I'm grateful that Principal Dr. S. B. Dahikar provided a platform for research for my studies. I would also like to use this occasion to express my sincere gratitude to all of the chemistry department's teaching and non-teaching staff members at Sanjivani Arts, Commerce, and Science College for their prompt, courteous collaboration.

Authors Contribution

The study was developed by MB, GA, and PD, and was carried out by MB, PD, and SG with assistance from MB, GA.

References

Acevedo-Rodríguez, P. (2005). Vines and climbing plants of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium, 51, 1-48

Agbebi, E. A., Alabi, O. S., N krumah, A. O., & Ogbole, O. O. (2022). Evaluation of the antibacterial and antifungal potentials of peptide-rich extracts from selected Nigerian plants. European Journal of Integrative Medicine, 54, 102163.

Arnon, D. I. (1949). Copper enzymes in isolated chloroplasts. Polyphenoloxidase in Beta vulgaris. Plant physiology, 24(1), 1.

Giri, S., Giri, U., Subedi, K., Magar, K. T., Pant, S., & Joshi, K. R. (2020). Thin layer chromatography (TLC) based chemical profiling and antioxidant activity of selected Nepalese medicinal plants. Journal of Health and Allied Sciences, 10(2), 15-22.

Bligh, E. G., & Dyer, W. J. (1959). A rapid method of total lipid extraction and purification. Canadian journal of biochemistry and physiology, 37(8), 911-917.

DuBois, M., Gilles, K. A., Hamilton, J. K., Rebers, P. T., & Smith, F. (1956). Colorimetric method for determination of sugars and related substances. Analytical chemistry, 28(3), 350-356.

Ghosh, C., Hazra, L., Nag, S. K., Sil, S., Dutta, A., Biswas, S., & Chatterjee, S. (2019) Allamanda cathartica Linn. Apocynaceae: A mini. world, 16, 17.

Hameed, A., Nawaz, G., & Gulzar, T. (2014). Chemical composition, antioxidant activities and protein profiling of different parts of Allamanda cathartica. Natural product research, 28(22), 2066-2071.

Harbone JB (1984). Plant Chemo-systematic, Academic Press, London.

Harbone JB (1988). Phytochemical Methods: A Guide to Modern Technique of Plant Analysis, 3rd Edition. London: Chapman and Hall.

Hossen, S. M., Islam, M. J., Hossain, M. R., Barua, A., Uddin, M. G., & Emon, N. U. (2021). CNS anti-depressant, anxiolytic and analgesic effects of Ganoderma applanatum (mushroom) along with ligand-receptor binding screening provide new insights: Multi-disciplinary approaches. Biochemistry and Biophysics Reports, 27, 101062.

Joselin, J., Brintha, T. S. S., Florence, A. R., & Jeeva, S. (2012). Screening of select ornamental flowers of the family Apocynaceae for phytochemical constituents. Asian Pacific Journal of Tropical Disease, 2, S260-S264.

Keawpradub, N., Eno-Amooquaye, E., Burke, P. J., & Houghton, P. J. (1999). Cytotoxic activity of indole alkaloids from Alstonia macrophylla. Planta medica, 65(04), 311-315.

Kirtikar, K. R., &Basu, B. D. (1994). Indian Medicinal Plants (Vol 4, 2nd Edn).

Lowry, OH, NJ Rosbrough, AL Farr, and RJ Randall. J. Biol. Chem. 193: 265. 1951.

Okoduwa, S. I., Mbora, L. O., Adu, M. E., &Adeyi, A. A. (2015). Comparative analysis of the properties of acid-base indicator of Rose (Rosa setigera), Allamanda (Allamanda cathartica), and Hibiscus (Hibiscus rosa-sinensis) flowers. Biochemistry research international, 2015.

Petricevich, V. L., &Abarca-Vargas, R. (2019). Allamanda cathartica: a review of the phytochemistry, pharmacology, toxicology, and biotechnology. Molecules, 24(7), 1238.

Ponni, V., Thenmozhi, S., &Rajan, S. (2009). Screening of bioactive potentials and phytochemical nature of Solanum trilobatum extracts. J Basic Appl Bio, 3(3&4), 134-139.

Wong, S. K., Lim, Y. Y., Abdullah, N. R., &Nordin, F. J. (2011). Assessment of antiproliferative and antiplasmodial activities of five selected Apocynaceae species. BMC complementary and alternative medicine, 11(1), 1-8.