

# Study on Biological Activities of Phytochemicals and Proteins from *Datura alba* Seeds

Wajiha Tahir\*, Syeda Maryam Fatima\*, Humera Waheed

Dow College of Biotechnology, Dow University of Health and Sciences, Ojha Campus, Karachi, Pakistan

\*E-mail: wajihatahir83@gmail.com

## ABSTRACT

---

Plants have been used from ancient times to treat various ailments and the trend is still ongoing. WHO has reported that 80% of the world's population relies on traditional medicine for some aspect of their primary healthcare. *Datura* is a wild weed famous for its broad-spectrum medicinal properties and plays key role in traditional medicine such as in Tibetan, Ayurveda, and Traditional Chinese Medicine *etc.* The medicinal importance of various species of *Datura* around the globe is the main inspiration of our research. Different parts of *Datura* such as Leaves, seeds, roots, flowers have been used traditionally for the treatment of different disease conditions such as diarrhea, epilepsy, wounds and burns, skin ulcers and as anti-asthmatic, antitussive, antispasmodics, bronchodilator, antiseptic, sedative, reproductive, wound healing effects and more. Therefore, this study is designed with intent to analyze proteins and phytochemical constituents from *Datura alba* seeds for their various biological activities. The seeds from *Datura alba* were collected and after processing phytochemical and protein extraction were performed in various solvents and biological buffers respectively. The phytochemicals composition was analyzed by TLC and other chemical methods. Similarly, proteins were analyzed by SDS-PAGE. Various biological activities (anti-amylase, antibacterial, anti-phospholipase, antioxidant *etc.*) were performed. Analysis of such biological activities might pave ways for the identification of new drug compounds against various infectious and non-infectious diseases. With the help of such revolutionary approaches for drug analysis and identification new lead molecules with strong healing potential could be discovered.

**Keywords:** Anti-bacterial, Anti-phospholipaseA2, Anti-oxidant, *Datura alba*, Traditional medicine

---

## INTRODUCTION

From ancient time plants have been used as a drug source for medicinal purposes. Advancements in science have led us to gain knowledge about biologically active and structurally diverse molecules contained in plants that possess the potential to be used as drug molecules for the treatment of mild and chronic diseases. *Datura* is a perennial herb, a genus of 10 species distributed in Australia, Mexico, Pakistan and India. In Pakistan, four species of *Datura* have been found which is *Datura Stramonium*, *Daturafastuosa* (*D. alba*), *Datura inoxia* and *Datura suaveolens*. Among various species, *D. alba* is known as the useful therapeutic plant due to its significant chemical & medicinal properties. It is commonly known as Angels Trumpet or Devils Trumpet, and belongs to the family Solanaceae. It grows with an average height of 1.5m and blooms in spring with attractive white flowers of trumpet like shape. It contains significant biomedical properties like anti-asthmatic, anti-diarrheal, anti-spasmodic, antitussive, an-aesthetic, anti-rheumatic effects and hallucinogenic effects [1]. In traditional medicine, a single herb or plant contains various phytochemical constituents, such as phenols, terpenoids, alkaloids, flavonoids and proteins which have great medicinal importance. 25% of drug have been derived from plant source, few examples include such as Taxol, Artemisinin, and Bicyclol which is FDA approved [2]. Apart from phytochemical extraction from plants, protein extraction is also becoming an area of

research interest as they shown to exhibit beneficial biological activities like antidiabetic, antihypertensive, antifungal, antiviral, anti-oxidant and antimicrobial [3]. Opuntin B, an antiviral protein isolated from Prickly Pear plant. Similarly, Peptide hydrolysate (PHs), isolated from lupin seeds and characterized as ACE inhibitors and can be used to treat hypertension.

Keeping in view the medicinal importance of *Datura alba* and its key role in traditional medicine, this study is intended to isolate proteins and phytochemicals from *Datura alba* seeds. Screening for its broad-spectrum biological activities including anti-enzymatic, antioxidant, and anti-microbial would help us to treat infectious and non-infectious disease conditions.

## OBJECTIVES

- i. Extraction of phytochemicals and proteins from *Datura alba* seeds.
- ii. Analysis of phytochemical composition by using TLC and other chemical methods. Similarly, proteins analysis done by using SDS-PAGE.
- iii. Various biological activity profiling of phytochemicals and proteins.

## METHODOLOGY

### Sample Collection:

*Datura alba* seeds were collected locally from the vicinity of Dow University of Health and Sciences, Karachi, Pakistan. After sample collection, seeds were retrieved from pods, washed, air dried and stored until further processing.

### Extraction of Bioactive Compounds:

#### Phytochemicals:

The seeds were pulverized and soaked in methanol for phytochemicals extraction in 60 days divided into four soaks, each one of 15 days and rotary evaporated. The methanolic extracts obtained were successively partitioned using organic solvents of different polarities which includes ethyl acetate, n-hexane, n-butanol and dichloromethane.

#### Proteins:

The seeds were pulverized and defatted using n-hexane overnight at room temperature. After defatting, extraction is carried out using three biological buffer system such as Tris, Acetate and phosphate buffers. Ammonium sulphate precipitation of crude protein extract is performed and dialyzed for further purification. Concentrated protein sample was lyophilized and stored at -40°C.

### Qualitative analysis of Crude Extracts:

TLC and different chemical tests were performed for the identification of phytochemicals such as test for alkaloids, flavonoids, terpenoids, saponins and tannins.

Extracted protein profile were analyzed using SDS-PAGE gel electrophoresis.

### In vitro Biological Activity Assays:

#### Anti-enzymatic activities:

The phytochemical and protein extracts are analyzed for anti-amylase, anti-phospholipase A2 and anti-protease activity by using agar well diffusion method. Inhibitory activity of both extracts is determined by measuring the diameter of zones in mm [4].

**Anti-microbial activities:**

Antibacterial assay against pathogenic strains of *E. coli* (ZMS60) and *S. aureus*(6538) is performed and antifungal assay against pathogenic strain of *Candida albicans* and *Candida tropicalis* is carried out using agar well diffusion method. Zone of inhibition is measured in mm [5].

**Anti-oxidant activity:**

DPPH free radical scavenging assay is performed to evaluate the antioxidant potential of extracted protein and phytochemicals. Absorbance measured at 517 nm using UV-vis spectrophotometer [4].

Percentage inhibition of radicals by test sample is calculated by using following formula:

$$\% \text{ Inhibition} = \frac{\text{Absorbance (Control)} - \text{Absorbance (Sample)}}{\text{Absorbance (Control)}} \times 100$$

**CONCLUSION**

The occurrence of such valuable bioactive compounds in different parts of *D. alba* and its uses in traditional medicine has led us to analyze broad-spectrum biological activities which might pave ways for the identification of new drug compounds. Therefore, with the help of such revolutionary approaches for drug analysis and identification new lead molecules with strong healing potential could be discovered.

**REFERENCES**

1. Al-Snafi, Ali Esmail. "Medical importance of *Datura fastuosa* (syn: *Datura metel*) and *Datura stramonium*-A review." *IOSR Journal of Pharmacy* 7.2 (2017): 43-58.
2. Wani, Mansukh C., and Susan Band Horwitz. "Nature as a Remarkable Chemist: A personal story of the discovery and development of Taxol®." *Anti-cancer drugs* 25.5 (2014): 482.
3. SonAwAne, SACHin K., and Shalini S. Arya. "Plant seed proteins: chemistry, technology and applications." *Current Research in Nutrition and Food Science Journal* 6.2 (2018): 461-469.
4. Giresha, A. S., M. G. Anitha, and K. K. Dharmappa. "Phytochemical composition, antioxidant and in-vitro anti-inflammatory activity of ethanol extract of *Ruta Graveolens* L. leaves." *Int J Pharm Pharm Sci* 7.10 (2015): 272-76.
5. Al Akeel, Raid, et al. "Evaluation of antibacterial activity of crude protein extracts from seeds of six different medical plants against standard bacterial strains." *Saudi journal of biological sciences* 21.2 (2014): 147-151.