

Phytochemical Investigation and In-Vitro Anti-Depressant Activity of Albizia Lebbeck

Basavaraj Chivade¹, Padma s Sagar², Nagendrakumar Dhumansure³

¹Department of Pharmacology, SVET College of Pharmacy Humnabad, Bidar

²Department of Pharmacology, SVET College of Pharmacy Humnabad, Bidar

³Department of Pharmaceutics, SVET College of Pharmacy, Bidar

Abstract: *The plant Albizia lebbeck is a species of the family Fabaceae. Native to Indian subcontinent and Myanmar. It is widely cultivated and naturalized in other tropical and subtropical regions, including Australia. Albizia lebbeck plant was selected because of its therapeutic uses, the part used was leaves. The leaves of Albizia lebbeck were extracted using maceration and soxhlet extraction process and yield obtained was 2mg and 86.23mg respectively, so soxhlet extraction gives better yield when compared with maceration. By invitro assay method the methanolic extract of Albizia lebbeck leaves produced better Anti depressant activity against PC12 and C6 cell lines, which is supported by increased cell viability from inducing leaves extract of Albizia lebbeck on PC12 and C6 cell lines.*

Keywords: Albizia lebbeck, Fabaceae, Invitro, viability, cell lines

1. Introduction

Depression is an affective mental disorder characterized by extreme exaggeration and mood disturbance. Decreased brain cells of monoamines like noradrenaline, dopamine, and serotonin leads to depression.¹ Drugs that increase the level of these neurotransmitters in the CNS show antidepressant activity. Many of currently available antidepressant drugs have proven to be effective but they are burdened with some disadvantages such as various adverse effects, problematic interactions and relatively low response. On the other hand, drugs obtained from natural sources have good efficacy, least risk and low side effects profile. Therefore, herbal therapies should be considered as alternative medicines. In recent years, there has been growing interest in developing new antidepressant drugs from natural sources, one such source can be Albizia lebbeck.² The plant Albizia lebbeck is a species of the family Fabaceae. Native to Indian subcontinent and Myanmar.³ It is widely cultivated and naturalized in other tropical and subtropical regions, including Australia. Common names in English include Siris, Indian siris, East Indian walnut, Broomerain tree, Lebbeck tree, Frywood, Koko and

woman's tongue tree. The leaves are bipinnate 7.5 - 15 cm long with one to four pairs of pinnae. Each pinna with 6 - 8 leaflets. General chemical constituents in Albizia lebbeck include alkaloids, anthraquinones, essential oils, flavanoids, glycosides, saponins, steroids and triterpenoids.⁴ The plant possesses many therapeutic activities such as treatment of leprosy, ulcers, ophthalmic and skin eruptions, skin diseases. It is astringent also used by some cultures to treat boils, cough, eye flu, gingivitis, lung problems, pectoral problems. It is used as a tonic and is used to treat abdominal tumors, the bark is used medicinally to treat inflammation and also effective in migraine.

2. Materials and Methods

Albizia lebbeck plant was selected because of its therapeutic uses, the part used was leaves.

The leaves of Albizia lebbeck were collected locally from Tumkur and it was identified and authenticated. The leaves of Albizia lebbeck were cleaned and shade dried at 25 degree Celsius. The dried leaves were coarsely powdered by a mixer grinder and the powder was stored in



airtight container, and this was used throughout the investigation. In this process, 10g of coarsely powdered leaves of albizialebbeck drug was dissolved in 150ml of methanol and was allowed to stand at room temperature for 3 days with frequent agitation. Then the mixture was strained and the marc was pressed, the combined liquids were clarified by filtration. After boiling, the filtrate was evaporated and thick mass was collected.⁵

1) LCMS analytical technique

Sample Preparation: 10mg of the sample extract is dissolved in 2mL of Methanol. Filtered and Injected. Instrumentation: The Acquity H - class UPLC (Waters Corporation, Milford, MA, USA) was employed, which had an integrated vacuum degasser, automatic sample manager (Serial # C10UPA554M, Waters Corporation, Singapore), ultra - performance binary solvent manager (Serial # C10UPB081A, Waters Corporation, Singapore), and injection volume range of up to 100 μ L with an optional extension loop. A C18 stationary phase (BEH C18, 50 x 1.0mm, 1.7 μ) was used for chromatographic separation. A photodiode array detector (DAD) was employed in conjunction with a Xevo G2 - XS QToF (Serial # YFA1548, Waters Corporation, Wilmslow, UK) for mass spectrometric (MS) detection

2) In - vitro study of Albizia lebbek leaves by MTT Assay Method

MTT assay is a colorimetric assay used for the determination of cell proliferation and cytotoxicity, based on reduction of the yellow coloured water soluble tetrazolium dye MTT to formazan crystals. Mitochondrial lactate dehydrogenase produced by live cells reduces MTT to insoluble formazan crystals, which upon dissolution into an appropriate solvent exhibits purple colour, the intensity of which is proportional to the number of viable cells and can be measured spectrophotometrically at 570nm.

3. Result and Discussion

PC12 and C6 cell lines are used to determine the antidepressant activity, by MTT assay we have evaluated the

antidepressant activity of methanolic extract of albizialebbeck leaves depending on the percentage cell viability. The result have been summarised in Table No 1 and 2. It is seen that the methanolic extract of albizialebbeck leaves at 10ug/ml concentration showed antidepressant activity near to that of a Standard drug Fluoxetine at 10ug/ml concentration. By inducing cytotoxic drug Doxorubicin at 0.3ug/ml concentration preliminarily to PC12 and C6 cell lines the cell viability is decreased then the Standard drug Fluoxetine and Methanolic extract of albizialebbeck leaves is added to estimate the percentage increase in cell viability.

From this study we have determined that increase in the percentage of cell viability will increase the number of live and healthy cells which directly promotes the normal functioning of cells. On phytochemical screening of methanolic extract of albizialebbeck leaves by general test and by LCMSMS test we determined the presence of Alkaloids, flavonoids, saponins, phenolic acids, carbohydrates and proteins. Therefore, from this study we can presume that out of many phytoconstituents determined by general test and also by LCMSMS test, one or few constituents present in methanolic extract of albizia lebbek leaves are responsible for the exhibited Antidepressant activity.

1) % cell viability of Methanol extract against C6 cells

S. No	Concentration (ug/ml)	% cell viability
1)	Untreated	100
2)	Doxorubicin induced 0.3ug/ml	40.67
3)	Standard drug - 10ug/ml	91.21
4)	Test sample - 10ug/ml	84.28

2) %Cell viability of methanol extract against PC12 cell

S. No	Concentration (ug/ml)	% cell viability
1)	Untreated	100
2)	Doxorubicin induced 0.3ug/ml	41.63
3)	Standard drug - 10ug/ml	94.12
4)	Test sample - 10ug/ml	91.32

4. Conclusions

The leaves of *Albizia lebbbeck* were extracted using maceration and soxhlet extraction process and yield obtained was 2mg and 86.23mg respectively, so soxhlet extraction gives better yield when compared with maceration. General chemical tests indicated presence of carbohydrates, alkaloids, proteins, saponins, and flavonoids. Whereas on further analysis by LCMS it showed presence of flavonoid glycosides, polyphenols, terpenoids and steroidal saponins, among this some of the constituents may be effective in showing Antidepressant activity. By In vitro assay method the methanolic extract of *Albizia lebbbeck* leaves produced better Antidepressant activity against PC12 and C6 cell lines, which is supported by increased cell viability from inducing leaves extract of *Albizia lebbbeck* on PC12 and C6 cell lines. From this in vitro assay performed and observations noted, it can be concluded that *Albizia lebbbeck*, Benth (Fabaceae) possess significant Antidepressant activity when compared with that of the standard marketed drug,

References

- [1] PardheHA, Nagalakshmi NC, Hariprasad MG, Chourasia PK, Nandini S. A review: Medicinal plants with antidepressant properties. *Indian J. Neurosci.*2020; 6: 1 - 5
- [2] VikramHP, SwatiJK. Evaluation of antidepressant – like effect of citrus maxima leaves in animal models of depression.
- [3] Shirisha K, Priyanka B, Rahman H, Bardalai D, Ali F. Review on *Albizia lebbbeck* (L.) Benth: a plant possessing diverse pharmacological activities. *Research Journal of Pharmacognosy and Phytochemistry.*2013 Sep 1; 5 (5): 263
- [4] Brown S. Estimating biomass and biomass change of tropical forests: a primer. Food & Agriculture Org.; 1997
- [5] Duke JA. Dr. Duke's Phytochemical and Ethnobotanical Databases - *Albizia Lebbeck* (online)
- [6] VermaSC, Vashishth E, SinghR, KumariA, MeenaAK, Pant P, Bhuyan GC, Padhi
- [7] MM. A review on parts of *Albizia lebbbeck* (L.) Benth. Used as Ayurvedic drugs. *Research J. Pharm. And Tech.*2013; 6 (11): 1235 - 41.
- [8] Correia AS, Fraga S, Teixeira JP, Vale N. Cell Model of Depression: Reduction of Cell Stress with Mirtazapine. *International Journal of Molecular Sciences.*2022 Apr 29; 23 (9): 4942.
- [9] BieleckaAM, ObuchowiczE. Antidepressant drugs can modify cytotoxic action of temozolomide. *European Journal of Cancer Care.*2017 Sep; 26 (5): e12551
- [10] PhoraksaO, Chimkerd C, Thiyajai P, Judprasong K, Tuntipipat S, Tencomnao T, Charoenkiatkul S, Muangnoi C, Sukprasansap M. Neuroprotective Effects of *Albizia lebbbeck* (L.) Benth. Leaf Extract against Glutamate - Induced Endoplasmic Reticulum Stress and Apoptosis in Human Microglial Cells. *Pharmaceuticals.*2023 Jul 10; 16 (7): 989
- [11] SrivastavNeetiSS, VijayJ, TiwariBrijeshK. Anticonvulsant activity of leaf extracts of *Albizia lebbbeck* in experimental rats. *Int J Pharm Sci Rev Res.*2016; 41: 173 - 6.
- [12] Dr Neetisrivastav, Antimicrobial Potential of *Albizia lebbbeck* Leaf Extract, *Int. J. Pharm. Sci. Rev. Res.*, 61 (1), March - April 2020; Article No.04
- [13] Malaikolundhan H, Mookkan G, Krishnamoorthi G, Matheswaran N, Alsawalha M, VP, Krishna Mohan S, Di A. Anticarcinogenic effect of gold nanoparticles synthesized from *Albizia lebbbeck* on HCT - 116 colon cancer cell lines. *Artificial cells, nanomedicine, and biotechnology.*2020 Jan 1; 48 (1): 1206 - 1
- [14] screening and antioxidant activity of *Albizia lebbbeck* (L.) Benth (Seed). *World journal of Advanced Research and Reviews.*2020; 7 (1): 035 - 40
- [15] Sivakumar B, Velmurugan C, Bhargava A, Kumar PL. Research and Reviews: *Journal of Pharmacology and Toxicological Studies.*
- [16] Kamala Lakshmi B, Valarmathi S. In vitro anti - inflammatory activity of aqueous extract of *Albizia lebbbeck* leaf (L.). *J. Phytopharmacol.*2020; 9: 356 - 60.
- [17] Bobby MN, Krupanidhi S, Peele KA, Indira M, Wesely EG, Reddy AR, Venkateswarulu TC. Screening of Antifungal Potential of Leaf Extracts from *Albizia lebbbeck* (L.) Benth. *Current Trends in Biotechnology & Pharmacy.*2019 Oct 1; 13 (4).
- [18] Gupta RS, Kachhawa JB, Chaudhary R. Antispermatic, antiandrogenic activities of *Albizia lebbbeck* (L.) Benth bark extract in male albino rats. *Phytomedicine.*2006 Mar 13; 13 (4): 277 - 83
- [19] Agbo JA, Kadiri E, Gambo PP, Ojo EO, Igwe ON, Bot YS, Chundusu D, Ekwenpu AI, Ahmed AA, Ajiji AJ, Agbo OH. Anti - Diabetic Effect of Methanolic Extract of *Albizia lebbbeck* (L.) Benth Leaf on Alloxan - Induced Diabetic Albino Rats. *European Journal of Medicinal Plants.*2021 Sep 16; 32 (8): 60 - 7.
- [20] HandaSS. An overview of extraction techniques for medicinal and aromatic plants. *Extraction technologies for medicinal and aromatic plants.*2008; 1 (1): 21 - 40
- [21] Handa SS. An overview of extraction techniques for medicinal and aromatic plants. *Extraction technologies for medicinal and aromatic plants.*2008; 1 (1): 21 - 40