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IN VITRO ANTI-DANDRUFF STUDY AND PHYTOCHEMICAL SCREENING OF AQUEOUS EXTRACT OF *ALLAMANDA CATHARTICA* L. LEAVES

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ABSTRACT

The study focuses on the Invitro anti-dandruff study and phytochemical screening of aqueous extract of *Allamanda cathartica* L. leaves dandruff is a common scalp disorder primarily caused by the lipophilic yeast *Malassezia furfur*. Although several synthetic antifungal agents are available for its treatment, prolonged use may lead to adverse effects and the development of resistance. This has increased interest in herbal remedies as safer alternatives. The present study was undertaken to evaluate the antidandruff potential of *Allamanda cathartica* L. leaf extract and to investigate its phytochemical constituents. The study includes leaves collection, authentication, shade dry, powdering and extraction using distilled water by the Maceration method. Preliminary phytochemical screening revealed the presence of carbohydrates, alkaloids, glycosides, flavonoids, tannins and lipids. The anti-dandruff activity of the aqueous extract assessed against *Malassezia furfur* using the agar well diffusion method, with Ketoconazole as the standard drug. The extract exhibits a measurable zone of inhibition at higher concentrations, indicating significant anti-dandruff activity. The study confirms that *Allamanda cathartica* L. possesses promising anti-dandruff potential may serve as natural, effective alternative for the management of dandruff, subject to further formulation

development and clinical evaluation.

KEYWORDS: *Allamanda cathartica*, Anti-dandruff, *Malassezia furfur*, Phytochemical screening, Agar well diffusion, Ketoconazole.

INTRODUCTION

Medicinal plants serve as valuable sources of therapeutic agents and bioactive compounds. Each plant consists of several important ingredients that can be used in medical field, and being involved in the development of different kind of drugs.[1] The World Health Organization estimates that a large percentage of the global population relies on herbal medicine for primary healthcare. Dandruff is a chronic scalp condition characterized by flaking and itching. It is mainly associated with the overgrowth of *Malassezia furfur*, a lipophilic yeast that metabolizes scalp sebum and produces inflammatory by-products. Conventional treatments include antifungal agents such as ketoconazole, zinc pyrithione, selenium sulfide, and salicylic acid.[2] However, long-term use may cause irritation and resistance. *Allamanda cathartica*, commonly known as Golden Trumpet, belongs to the family Apocynaceae.[3] The plant contains iridoids, flavonoids, tannins, saponins, and phenolic compounds, which are known for antimicrobial and anti-inflammatory properties.

This study investigates in vitro anti-dandruff activity of its aqueous leaf extract against *Malassezia furfur* and also focuses on the phytochemical screening of its aqueous leaf extract to identify bioactive constituents responsible for anti-dandruff activity.

MATERIALS AND METHODS

MATERIALS

Plant material: Dried leaves of *Allamanda cathartica* L. Chemicals: Sabouraud Dextrose Agar Olive oil Ketoconazole Distilled water.

Microorganism*: Malassezia furfur* (MTCC 1374)

METHODS

1. PLANT MATERIAL COLLECTION AND AUTHENTICATION

Fresh leaves of *Allamanda cathartica* were collected from Malappuram district, Kerala, and authenticated by the Department of Botany, NSS Arts and Science College, Palakkad.

2. PHARMACOGNOSTIC STUDY

Macroscopic study: An organoleptic and external morphological character of freshly collected

leaves was observed under magnifying lens.

Microscopic Study: Thin transverse sections of leaves were prepared by free-hand sectioning and stained with safranin to detect lignified tissues. Microscopic evaluation included determination of leaf constants:[4]

- Stomatal Number
- Stomatal Index
- Vein Islet Number
- Vein Termination Number

3. DRYING AND COARSE POWDERING OF PLANT MATERIAL

The leaves of *Allamanda cathartica* L. were thoroughly washed in running water and shade dried. It was then ground to coarse powder.

4. PREPARATION OF AQUEOUS EXTRACT

Aqueous extract of *A.cathartica* leaves were prepared by cold maceration method. 5 g of accurately weight powdered air-dried drug was macerated with 100 ml of chloroform water in a closed flask for twenty-four hours, shaking frequently during six hours and allow standing for eighteen hours. It was then filtered rapidly, taking precautions against loss of solvent. After maceration, filter the mixture using muslin cloth into a clean beaker. Squeeze the residue gently to recover as much extract as possible. 25 ml of the filtrate was evaporated to dryness and dried to a constant weight and weighed Store the extract in a refrigerator at 4^0C. For longer storage, consider concentrating or drying the extract.[5]

Extractive value (%) = (Weight of extract(g) / Weight of herb(g)) × 100

5. PHYTOCHEMICAL SCREENING

Qualitative Analysis Standard tests were performed to detect:[6]

- Carbohydrates (Molisch’s test)
- Alkaloids (Mayer’s, Dragendorff’s tests)
- Glycosides (Trim-Hill test)
- Flavonoids (Alkaline reagent test)
- Tannins (Ferric chloride test)
- Lipids (Salkowski test)
- Proteins (Biuret test)

6. INVITRO ANTI-DANDRUFF ACTIVITY

The antidandruff activity of the test samples was evaluated using the agar well diffusion method. Malassezia furfur was cultured in Sabouraud Dextrose Agar (SDA or Sab Dex) which is specifically supplemented with Olive oil (1% or2%). The cultures are incubate at 30^0C– 37^0C for 48-72 hrs and adjusted to a standardized inoculum, then uniformly swabbed onto sterile agar plates. Wells of 6 mm diameter were aseptically punched and filled with 50 and 100 µL of Aqueous extract and Ketoconazole (100 µ1/10 µg) as the positive control. Plates are allowed to diffuse for 30 minutes and incubated at 30^0C – 37^0C for 48 hrs to 7 days and the diameter of zones of inhibition were measured in millimetres after incubation to assess antifungal efficacy.[7]

RESULTS AND DISCUSSION

RESULTS

The study involved pharmacognostic study, phytochemical screening and invitro anti-dandruff study of *Allamanda cathartica* L.

1. PHARMACOGNOSTIC STUDY

Macroscopic study

Table 1: macroscopic study of *A.cathartica.*

Characteristics	Description
Family	Apocynaceae
Leaf type	Simple
Leaf arrangement	Whorled (usually 3-4 leaves at a node), sometimes opposite.
Leaf shape	Elliptic to oblong - lanceolate
Leaf size	8-15cm long and 3-5cm wide
Apex	Acute to acuminate
Base	Cuneate to attenuate
Margin	Entire
Upper surface	Smooth, glossy, dark green
Lower surface	Slightly paler green, smooth
Venation	Pinnate, reticulate
Texture	Leathery (coriaceous)
Petiole	Short or nearly sessile
Odour	Characteristics, faint
Special features	Prominent midrib on lower surface; milky latex exudes when fresh leaf is broken

Microscopic study

1. Transverse section of *A.cathartica* was observed under microscope:

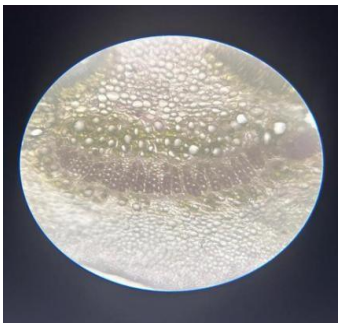
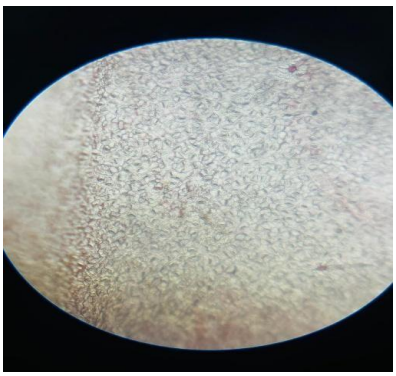


Fig.1: T.S. of *A.cathartica.*

2. Stomatal number and Stomatal index of *A.cathartica* were determined: Stomatal number was found to be 160.

Stomatal index was found to be 22.2%



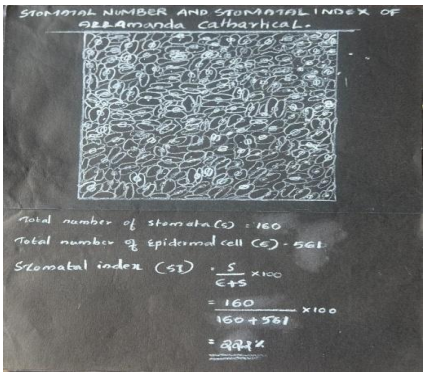
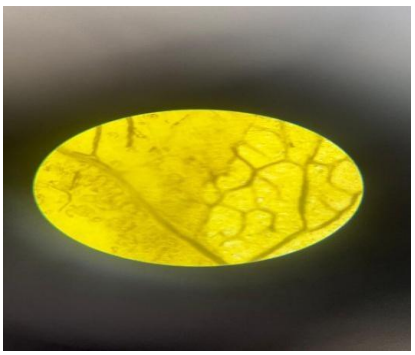


Fig.2: Determination of stomatal number and Stomatal index.

3. Vein islet and Vein termination number of *A.cathartica* were determined: Vein islet number was found to be 12.

Vein termination number was found to be 11.



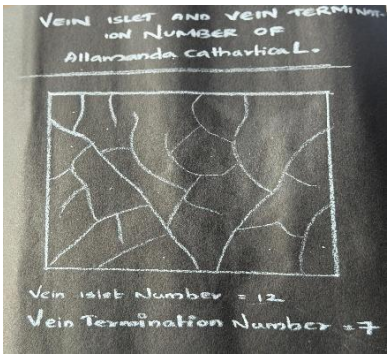


Fig.3: Determination of Vein islet and Vein termination number.

2. EXTRACTION

Extractive value was determined and was found to be 20.49%

3. PHYTOCHEMICAL SCREENING

Table 2: Phytochemical constituents of *A.cathartica* aqueous extract.

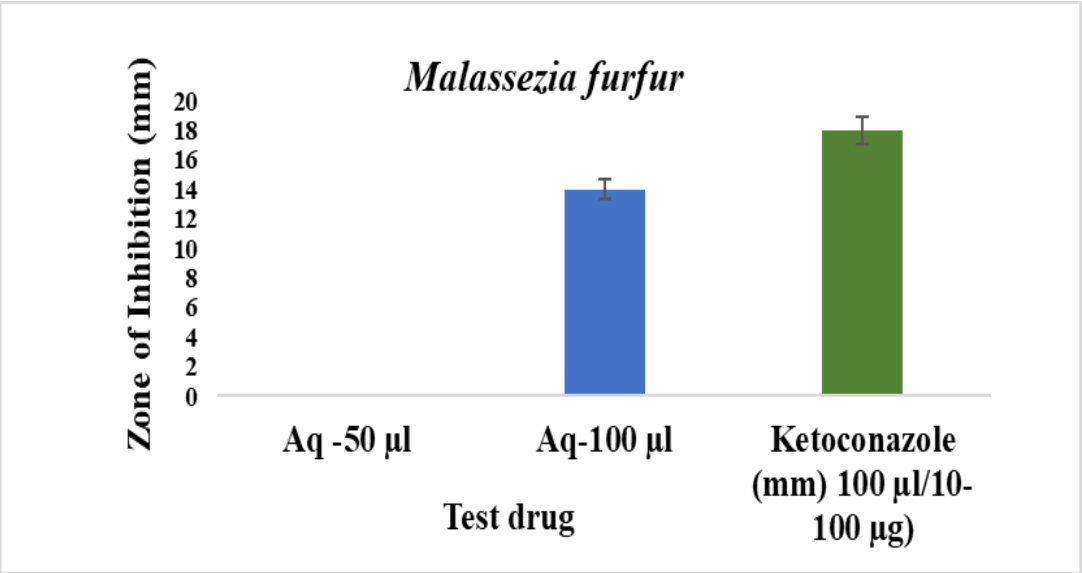
SL.NO	Phytochemical constituents	Result Obtained
1	Carbohydrate	+
2	Reducing sugar	+
3	Alkaloids	+
4	Glycosides	+
5	Flavonoids	+
6	Tannins	+
7	Lipids	+
8	Proteins	_

4. IN VITRO ANTI DANDRUFF ACTIVITY

The aqueous extract demonstrated concentration-dependent anti-dandruff activity against Malassezia furfur. The 100 µL concentration showed a significant zone of inhibition compared to 50 µL. Ketoconazole exhibited a larger zone of inhibition, serving as a positive control.

Table 3: The Anti-dandruff activity of the Aqueous extract and Ketoconazole.

Microorganism	Aq-50 µl	Aq -100 µl	Ketoconazole(mm) 100 µl/10-100µg
Malassezia furfur	0	14	18



Graph 1: The Anti-dandruff activity of the Aqueous and Ketoconazole.

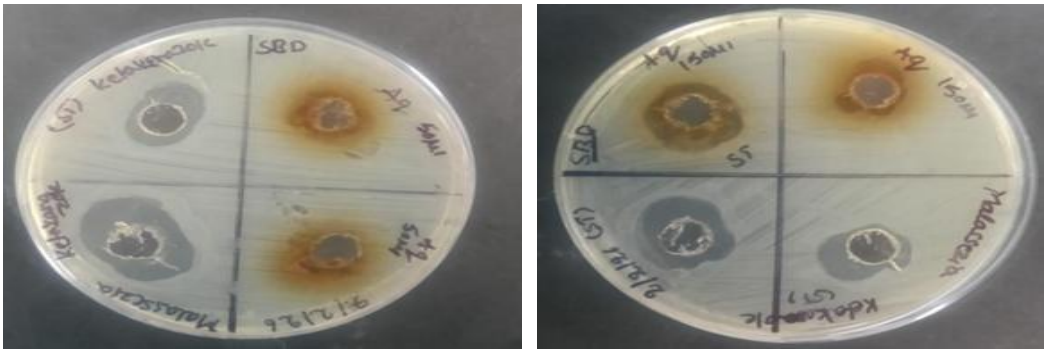


Fig 4: The Anti-dandruff activity of the Aqueous and Ketoconazole.

DISCUSSION

The washed, shade-dried leaves were powdered and evaluated for anti-dandruff activity against *Malassezia furfur*. Pharmacognostic analysis (macro and microscopic) confirmed plant authenticity, with leaf constants within acceptable limits. Phytochemical screening revealed alkaloids, flavonoids, tannins, glycosides, and lipids, compounds known for anti-dandruff and antioxidant effects. Using the agar well diffusion method, the aqueous extract showed no inhibition at 50 µL but produced a 14 mm inhibition zone at 100 µL, indicating moderate activity compared with ketoconazole. These findings support its traditional use for scalp disorders and suggest potential for further study using advanced extraction and formulation methods.

CONCLUSION

This study shows that *Allamanda cathartica* leaf extract has noticeable anti-dandruff activity against *Malassezia furfur*, likely due to natural compounds such as flavonoids, tannins, alkaloids, and glycosides. Although its effect was weaker than ketoconazole, the extract demonstrated moderate anti-dandruff action at higher concentrations. These findings support the plant's traditional use for scalp and skin problems and suggest it could be a safer, plant-based alternative for dandruff control. Further research is needed to isolate active compounds, improve extraction methods, and confirm safety and effectiveness through animal and clinical studies.

This study highlights *Allamanda cathartica* as a promising natural anti-dandruff agent. Future work should focus on isolating active anti-dandruff compounds, optimizing extraction methods, and developing herbal formulations such as shampoos or creams. Clinical and in-vivo studies are needed to confirm safety and efficacy, while advanced delivery systems and patent opportunities may support improved effectiveness and commercialization.

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