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RESEARCH ARTICLE

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QUALITATIVE PHYTOCHEMICAL ANALYSIS, CHROMATOGRAPHIC STUDIES, AND ANTIFUNGAL ACTIVITY TESTING OF *THUJA OCCIDENTALIS* LEAVES

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ABSTRACT: This research concerns itself with the phytochemical substances that can be isolated from the leaves of Thuja occidentalis; chromatographic characteristics of the plant; and the antifungal potentials of *Thuja occidentalis*. To determine the chemical tests for phytochemical screening of bioactive compounds, the tests that gave qualitative results were employed. Analytical methods that were used included chromatographic methods for instance thin layer chromatography (TLC). It was the procedure that had been used. Algorithms of the fungicidal influence of the substance were tested under the standard approach to examine changes in clinical isolates of fungi. In light of the current results, the special role of *T. occidentalis* into the process of forming new particular compounds in the antifungal medication therapeutic process is revealed.

Keywords: *Thuja occidentalis*, Phytochemical screening, Antifungal activity, Thin Layer Chromatography, Bioactive compounds

INTRODUCTION

When viewed from this perspective it is clear that natural compounds had always been the source of drug leads for medical chemistry right from time immemorial [1]. *Thuja occidentalis*, otherwise called arborvitae, is an ever-green tree of coniferous origin which has multifaceted utilization in the medical field due to its bacteriocidal and fungicidal properties [2]. To support the assertion about the medicinal value of the leaves of T. occidentalis, this study describes the phytochemical content, chromatographic profile and antifungal properties of the leaves [3].

Fig. 1: Plant of *Thuja occidentalis* [4]

MATERIALS AND METHODS

Collection and Preparation of Plant Material

Several experiments were performed on the green leaves of Thuja occidentalis collected from a reliable source and bought from a supermarket. These leaves were then confirmed as being of the type identified by a bona fide botanist. After the leaves had turned their darkest they were powdered and the extracted form was placed in airtight containers for further use [5].

Extraction Process

For a period of forty-eight hours, each sample of powdered plant leaf material, which weighed fifty grams, was macerated with three different solvents: Methanol ethanol as well as water solvents were also used in the experiment. After being filter sterilized, extracts of UVB irradiated or mock irradiated skin samples were concentrated using a concentrator under vacuum pressure. Thereafter, the concentrated extracts were stored at 4 degrees Celsius for further analysis [6].

Phytochemical Analysis
Qualitative Tests

In general, different conventional procedures were utilized in order to search for alkaloids. These methods were also utilized in order to search for flavonoids, tannins, phenolics, saponin, and terpenoids [7].

Chromatographic Studies
Thin Layer Chromatography (TLC)

Extracts were spotted on silica gel plates and developed in a solvent system of ethyl acetate, methanol, and water (8:1:1). Visualizations were carried out under UV light (254 nm) and iodine vapor [8].

Antifungal Activity Testing
Preparation of Extracts

Extracts were dissolved in 10% DMSO to prepare stock solutions (100 mg/mL) [9].

Agar Well Diffusion Method

Clinical isolates of *Candida albicans* and *Aspergillus niger* were inoculated on Sabouraud Dextrose Agar plates. Wells (6 mm diameter) were filled with 100 µL of each extract. Plates were incubated at 28°C for 48 hours, and zones of inhibition were measured in millimeters [10].

RESULTS
Phytochemical Screening Results

The phytochemical screening revealed the presence of key bioactive compounds, as shown in Table 1.

Table 1: Phytochemical Screening Results

Compound	*Test Performed*	*Result*
Alkaloids	Dragendorff's Test	Positive
Flavonoids	Shinoda Test	Positive
Tannins	Ferric Chloride	Positive
Saponins	Frothing Test	Positive
Phenolics	Folin-Ciocalteu	Positive
Terpenoids	Salkowski Test	Positive

Chromatographic Analysis
TLC Results

Distinct bands corresponding to flavonoids and phenolics were observed. Figure 2 shows the TLC plate with highlighted bands.

Fig. 2: TLC Identification of phytoconstituents in *Thuja occidentalis*

Table 2: Results of TLC screening of leaves of *Thuja occidentalis*

Extract	*Solvent System*	*No. of Spots*	*Colour of Spots*	*R_f Value*
Ethanolic extract	Formic acid: Benzene: Chloroform (5.5:4.5:2-3 drops)	5	Green	0.69
			Light green	0.49
			Dark green	0.64
			Blurred yellow	0.42
			Blurred yellow	0.34

Antifungal Activity Results

Table 2 provides a summary of the antifungal activity that the extracts possess. The methanolic extract demonstrated the greatest level of inhibition against *Candida albicans* (zone of 18 mm), whereas the ethanolic extract had the highest level of activity against *Aspergillus niger* (zone of 22 mm). There was a moderate amount of activity in aqueous extracts.

Table 3: Antifungal Activity Zones of Inhibition

Extract	*Candida albicans (mm)*	*Aspergillus niger (mm)*
Methanolic	18	16
Ethanolic	15	22
Aqueous	12	14

DISCUSSION

The research reveals that the leaves of *Thuja occidentalis* have the capacity to inhibit the growth of fungi, which can be related to the varied phytochemical profile of these leaves. According to the results of chromatographic examination, the presence of phenolics and flavonoids provides evidence that supports the bioactivities that have been documented for them. That both methanolic and ethanolic extracts exhibited vigorous antifungal activity shows that polarity in the solvent influences the ability of solvents to extract bioactive chemicals. These results suggest that *T. occidentalis* could be an effective therapeutic approach to treating fungal infection. Besides giving a scientific rationale for the observed antifungal activities, TLC findings confirm the presence of bioactive compounds.

CONCLUSION

The results of this study establish that the leaves of Thuja occidentalis possess considerable presence of the phytochemicals with essential antifungal properties. The possible use of these substances as a natural antifungal has been confirmed in chromatographic studies as well as in antifungal tests. In order to analyse mechanisms of action that these chemicals possess for therapeutic use, further study is suggested to be made in isolation of such chemicals.

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CONFLICT OF INTEREST: NIL

REFERENCES:

1. Gurib-Fakim A. Medicinal plants: traditions of yesterday and drugs of tomorrow. Molecular aspects of Medicine. 2006 Feb 1;27(1):1-93.
2. Flint HL. Landscape plants for eastern North America: exclusive of Florida and the immediate Gulf Coast. John Wiley & Sons; 1997 Apr 9.
3. Aworunse O, Bello O, Popoola J, Obembe O. Pharmacotherapeutic properties of *Telfairia occidentalis* Hook F.: A systematic review. Pharmacognosy Reviews. 2018 Jul 1;12(24).
4. Naser B, Bodinet C, Tegtmeier M, Lindequist U. *Thuja occidentalis* (Arbor vitae): a review of its pharmaceutical, pharmacological and clinical properties. Evidence-Based Complementary and Alternative Medicine. 2005;2(1):69-78.
5. SM A. Collection and preparation of soil, water and plant samples for analysis. International Journal of Forest, Soil & Erosion. 2018 May 1;8(2).

6. Schmidt MM, Dornelles RC, Mello RO, Kubota EH, Mazutti MA, Kempka AP, Demiate IM. Collagen extraction process. International food research journal. 2016 May 1;23(3):913.
7. Shaikh JR, Patil M. Qualitative tests for preliminary phytochemical screening: An overview. International Journal of Chemical Studies. 2020 Mar 1;8(2):603-8.
8. Ciura K, Dziomba S, Nowakowska J, Markuszewski MJ. Thin layer chromatography in drug discovery process. Journal of Chromatography A. 2017 Oct 20;1520:9-22.
9. Webster D, Taschereau P, Belland RJ, Sand C, Rennie RP. Antifungal activity of medicinal plant extracts; preliminary screening studies. Journal of ethnopharmacology. 2008 Jan 4;115(1):140-6.
10. Boyanova L, Gergova G, Nikolov R, Derejian S, Lazarova E, Katsarov N, Mitov I, Krastev Z. Activity of Bulgarian propolis against 94 *Helicobacter pylori* strains in vitro by agar-well diffusion, agar dilution and disc diffusion methods. Journal of medical microbiology. 2005 May;54(5):481-3.

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