



## Phytochemical and Anticytotoxic Activity of *Coscinium Fenestratum*

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### Abstract:

The present study was aimed to investigate the phytochemicals present in the stem extracts of *Coscinium fenestratum*. The phytochemicals were further separated by TLC method using different solvents. Dried powder of the stem extracts of *C. fenestratum* was extracted with methanol and water and was tested for the different phytoconstituents. The stem of *C. fenestratum* contains phytoconstituents like Alkaloids, Flavonoids, Tannins, Steroids and fixed oils along with Carbohydrates. The compounds in both the extracts were separated by TLC and the spots were analyzed. The antimicrobial activity of the two extracts was studied against a wide variety of MTCC strains. The methanolic extract was found to be more effective in inhibiting the bacterial and fungal growth than the aqueous extract. The two extracts were then used for the analysis of the cytotoxic activity by using the *Allium cepa* root tips. The mitotic and cytotoxic indices were calculated. It was seen that the methanolic extract was more cytotoxic than the aqueous extract.

**Keywords:** *Coscinium fenestratum* methanol extract, TLC, Onion root tip, cytotoxicity.

### Introduction:

*Coscinium fenestratum* (Gaertn.) Colebr. commonly known as Daruharidhra in Hindi and Maramanjai in Tamil is a plant of South Asian origin. The stem of this plant is used in many traditional medicinal preparations. In recent years the use of herbs for medicinal use has increased tremendously. Over 50% of all the modern drugs have natural plant origin <sup>[1, 2]</sup> There are many studies that have proved the role of dietary factors in the improvement of human health and in the treatment of certain chronic diseases including cancer <sup>[3, 4]</sup> According to the WHO (1977), “a medicinal plant” is any plant which in one or more of its organ contain substances that can be used for the therapeutic purposes or which are precursors for

the synthesis of useful drugs Phytochemicals present in a variety of plants are used as important components of both human and animal diets. These include fruits, seeds, herbs and vegetables.

Phytochemicals are the chemical compounds formed during normal metabolic processes. These chemicals are referred to as “secondary metabolites” of which there are several classes including Alkaloids, Flavonoids, Coumarins, Glycosides, Gums, Polysaccharides, Phenols, Tannins, Terpenes and Terpenoids <sup>[5]</sup>

In addition to these, plants contain other chemical compounds, which can act as agents to prevent undesirable side effects of the main active substances or to assist in the assimilation of the active substances <sup>[6]</sup> *Coscinium fenestratum* is a large woody climber which grows with a cylindrical and yellowish stem.

So far a few attempts have been made to evaluate the cytotoxic effects of *Coscinium fenestratum*. So the present study was aimed to investigate the cytotoxic effects of the aqueous and methanolic extracts of *C. fenestratum* using *Allium cepa* L. root tip cells.

### Materials and methods:

*Coscinium fenestratum* stem was collected from Chennai, Tamilnadu. The stem was identified with the Department of Plant Biology and Plant Biotechnology, Presidency College, Chennai and a herbarium was deposited there.

The stem of the plant was dried under shade and was made into fine powder using a laboratory mill and was subsequently extracted with methanol and water. The standard procedures used for the extraction of the aerial parts of the plants were employed. For the methanolic extract, about 200gm of the dried powder was mixed with 1liter of methanol and kept in a stirrer for 24 hours at room temperature. It was then

centrifuged and filtered. The residue was treated in the same way twice. The supernatants were pooled and evaporated to dryness.

For the aqueous extract, 200gm of the powder was mixed with 1.5 liter of water and boiled for 6 hours. Later centrifugation and filtration were done. The filtrate was used for further analysis.

The isolated fractions were weighed and the yield was calculated. Further, the extracts were used for Qualitative, Quantitative, Antimicrobial and Cytotoxic activities.

Different phytochemicals like Alkaloids, Flavonoids, Tannins, Saponins, etc present in the Aqueous and Methanolic extracts of *Coscinium fenestratum* were first analyzed and later quantitated using standard procedures for the same. Anti microbial activity and cytotoxicity in onion root tip cells were also analyzed using standard procedures.

#### Results:

In the present study, the stem of *C.fenestratum* was extracted with water and methanol.

The extracts were analyzed for the phytochemical constituents using standard procedures. The aqueous extract was pale brown in color and slightly viscous. Alkaloids, Flavonoids, Saponins, Tannins, Glycosides, Sterls, Triterpenoids, Carbohydrates, Fats and Fixed Oils were detected. (Table 1)

The methanolic extract was brownish in color and viscous. The extract showed all the phytoconstituents present in the aqueous extract. (Table 1)

Since many of the active medicinal compounds so far identified are alkaloids or flavonoids, the quantitative analysis of these two and the amount of tannins were estimated. Alkaloid content was 6.6%, Flavonoids 0.4%, and Tannins 1.66%.

Alkaloids and Flavonoids were also separated by TLC and the spots were analyzed (Fig 1)

The extracts were then used to assess the antimicrobial activity. Standard strains of bacteria

and fungi were used. It was seen that the methanolic extract had more potent antimicrobial activity. (Table 2, Fig 2)

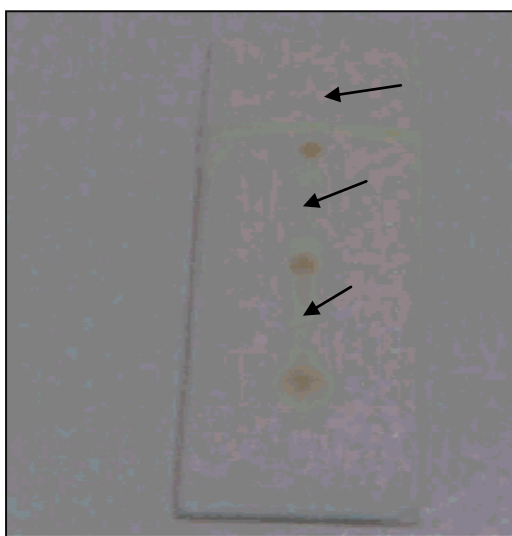
**Table 1: Phytoconstituents in the stem extracts of *Coscinium fenestratum***

Phytoconstituents	Aqueous extracts	Methanolic extract
1. Colour	Dark brown	Brownish yellow
2. Viscosity	Slightly viscous	Viscous
3. Alkaloids		
a. Mayer's test	+	+++
b. Wagner's test	++	+++
4. Saponins- Froth test	++	+
5. Glycosides – Keller Killiani test	+++	+
6. Tannins		
a. Gelatin test	++++	+
b. Ferric chloride test	+++	+
c. Alkaline test	+++	+
d. Mitchell's test	+++	+
7. Flavonoids		
a. Shinoda test	+	+
b. Zinc – HCl reduction test	+++	+
c. Alkaline reagent test	++	+
8. Sterols and triterpenoids		
a. Libermann – Burchard test	++	+
b. Salkowski test	+	+
9. Carbohydrates test		
a. Molisch test	-	-
b. Benedict's test	-	-
c. Carmentalistion	-	-
d. Fehling's test	-	-
10. Fats and fixed oils		
a. Stain test	+	-
b. Saponification test	++	-

**Table 2: Antimicrobial activity of the stem extracts of *Coscinium fenestratum***

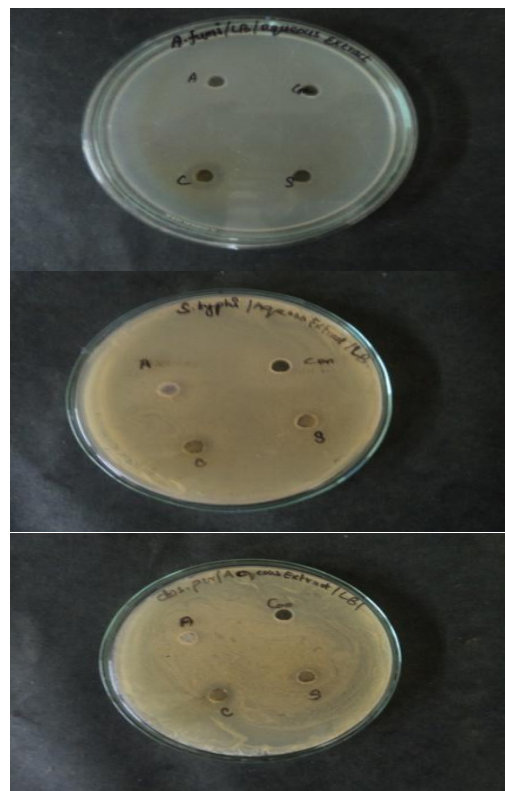
Micro organisms	Zone of inhibition (aqueous extract)	Zone of inhibition (methanolic extract)
1.E.coli	12	21
2. S.marcesens	10	17
3.S.aureus	-	12
4.B. cereus	9	18
5.C. perfringens	14	19
6.S. typhi	11	19
7.A.fumigatus	-	9
8.Candida	-	8
9.S.boulardii	-	-

**Figure 1: TLC of the stem extract of *C.fenestratum*.**



Both the extracts of *C. fenestratum* were subjected to plant cytotoxicity analysis using *Allium cepa* L root tip cells. Both the extracts showed low mitotic index and high cytolytic index. (Table 3)

**Figure 2: antimicrobial activity**



**Table 3: plant cytotoxic analysis in *Allium cepa* L. root tip of the stem extracts of *Coscinium fenestratum***

Treatment	Total number of cells	Mitotic index %	Cytolytic index %
1. Control (DMSO)	148	11.90	1.2
2. Methanolic extract	145	0.34	80.0
3. Aqueous extract	100	0.34	67.0

The methanolic extract also showed a dose dependent Anti Proliferative activity.

**Conclusion:**

Plant substances continue to serve as viable source of drugs for the world's population and several plant based drugs are in extensive clinical use. Agents capable of inhibiting cell proliferation, inducing apoptosis or modulating signal transduction are currently used for the treatment of cancer. The use of multiple chemo preventive agents or agents with multiple targets is considered to be more effective in cancer treatment.

So it is necessary to assess the phytochemical properties of a plant and screen for any active compounds present. In the present study, the screening of phytoconstituents and their separation by TLC were done using the Aqueous and Methanolic extracts of *C. fenestratum*.

Further, cytotoxic activity was assessed by analyzing the inhibition of microbial growth and also by the cytotoxic effect of *Allium cepa* L root tip cells. The results obtained are well correlated with previous reports from different plant extracts on cancer suppressing activity or Anti Carcinogenic activity.

In conclusion, this study on the cytolytic activity of *C. fenestratum* stem extracts should be helpful in explaining further the complex pharmacological activity of this traditional medicinal plant. This also confirms the potential use of this plant as anticancer agent.

Further extensive studies are required to isolate the specific chemical compound and the assessment of its activity to prove that as a specific cancer drug.

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