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RESEARCH ARTICLE

PHYTOCHEMICAL AND FTIR ANALYSIS OF *TINOSPORA CORDIFOLIA*

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ABSTRACT

Tinospora cordifolia is one of the most important medicinal plants and used in formation of important drug in ayurvedic system of medicine. It is prescribed for many diseases such as fever, general debility, diabetes, urinary infections, jaundice and skin diseases. Aqueous and Methanolic extracts of *Tinospora cordifolia* was evaluated for their phytochemical analysis. FTIR of methanolic stem, leaf and aqueous stem, leaf is analyzed. Phytochemical screening of *Tinospora cordifolia* extract revealed the presence of various bioactive components such as Resins, Diterpenes, Flavenoids, Phenols, Carbohydrate, Alkaloids and Amino acids. Further, Fourier Transform Infrared Spectroscopy (FTIR) has strengthened the Phytochemical clarification. In present study phytochemical investigation of *Tinospora cordifolia* was performed. It showed the presence of Resins, Diterpenes, Flavenoids, Phenols, Carbohydrate, Alkaloids and Amino acids. The presence of bioactive compounds shows the importance of medicinal plants as an efficient of therapeutic agents.

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INTRODUCTION

India is bestowed with enormous biodiversity of medicinal plants. Among them *Tinospora cordifolia* has a wide array of bioactive principles as well as it has been proven medicinally important plant (Mittal et al., 2014). Genera *Tinospora* consists of about 15 species. Some of the medicinally important species are *T. cordifoli*, *T. crispa*, *T. cordifolia*, *T. malabarica*, *T. tomentosa*, *T. uliginosa*, etc. In Ayurvedic system of medicine *Tinospora cordifolia* commonly known as Guduchi, is widely used the immune system and body resistance against infections. In modern medicine it is used for general weakness. According to Patanjali yogapith this plant is very effective in preventing swine flu that has been declared epidemic worldwide (Kaur et al., 2016). It is widely used as anti-bacterial, analgesic, antipyretic and also for the treatment of jaundice, skin diseases, anemia etc. the bitter principle present shows several medicinal applications viz. antiperiodic, antispasmodic, anti-inflammatory, immunomodulatory or immunostimulatory, antitumor, cognition, anti-neoplastic, antihyperglycemia, antihyperlipidemia, antioxidant, antituberculosis, gastrointestinal and antipyretic properties. The pharmaceutical significance of this shrub is mainly because of various bioactive compounds found in this plant such as glucoside, alkanoidal constituents including berberine, three fatty alcohol, a bitter glucoside giloin a nonglucosidic bitter substance gilonin (Panday et al., 2012).

MATERIALS AND METHODS

Plant collection and Authentication

The young leaves and stems of *Tinospora cordifolia* were collected from farm site, Pachod (Ekod) Aurangabad. And were identified by the Botanical department, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. The plant leaves and stems were washed carefully with tap water followed by sterile distilled water and shade dried at room temperature for 10-15 days.

Plant Extraction

The dried leaves and stems sample powdered (5g) was loaded in the inner tube of the Soxhlet apparatus and then fitted into a round bottom flask containing respective Methanol and Water. The solvent was boiled gently (60 ° to 80°) over heating mantle using adjustable rheostat. The extraction was continued until complete extraction was effected 24 to 30 hr. The final extracts were concentrated and dried (Gawai et al., 2013).

Phytochemical analysis

Gums Tests: Hydrolyzing the 1ml of extract using dil. HCL 3ml then Fehling's solution was added drop by drop till the appearance of red color (Mishra et al., 2014).

Detection of resins (Acetone-water test): Extract were treated with acetone, with small amount of water was added

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and shake the appearance of turbidity indicates the presence of resins (Kaur *et al.*, 2016).

Detection of Diterpenes Copper-acetate solution: Extract was dissolve in water and treated with a few drops of copper acetate solution. Formation of emerald color indicates presence of Diterpenes (Kaur *et al.*, 2016).

Detection of Flavenoids

Lead acetate test: Few drops of lead acetate solution formation of yellow colored precipitates indicate the presence of Flavenoids (Kaur *et al.*, 2016).

Alkaline reagent test: Few drops of 20% sodium hydroxide solution was added to 2 ml of extract formation of intense yellow color, which become colorless on solution of dilute hydrochloric acid revealed the presence of Flavenoids (Kaur *et al.*, 2016).

Test for Tannins (Braymer's test): 2 ml of extract was treated with 10% ferric chloride solution and observed for formation of blue or greenish color solution (Jyoti rani *et al.*, 2015).

Test For Terpenoids (Salkowki test): 2 ml of each extract was treated with chloroform (1 ml) followed by few drops of concentration. Sulfuric acid, reddish brown precipitate produce immediately, indicates the presence of terpenoids (Jyoti rani *et al.*, 2015).

Test for Phenols (Ferric chloride test): A fraction of extract was treated with aqueous 5% ferric chloride and observes for formation of deep blue or black color (Jyoti rani *et al.*, 2015).

Test for Saponins (Foam test): 2 ml of extract was added in 12 ml of water in a test tube; the mixture was shaken vigorously and observes for the formation of persistent foam (Jyoti rani *et al.*, 2015).

Test for cardiac glycosides (Keller-Kellani test): 5 ml of each extract was treated with 2 ml of glacial acetic acid in a test tube and 1 ml ferric chloride solution was added to it this was carefully heated and then cooled. Then this was transferred to a test tube containing 2 ml concentration sulfuric acid a brown ring at the interface indicate the presence of deoxysugar characteristic of cardinolides a violet ring may appear below the ring while in the acetic acid layer. A greenish ring may form (Jyoti rani *et al.*, 2015).

Test for Alkaloids (Wagner's reagent): A small amount of extract was treated with 2 ml of Wagner's reagent (1.27 g of iodine and 2 gm of potassium iodide in 100 ml of water) and observed till the formation of reddish brown precipitate or coloration.(Jyoti rani *et al.*, 2015).

Test for Carbohydrate (Benedict's test): A few drops of Benedict's reagent was added to 2 ml portion of the various extracts, boiled in water bath for 5min, cooled and observed for a reddish brown precipitate (Jyoti rani *et al.*, 2015).

Test for amino acid and proteins (1% Ninhydrin solution): 2 ml of filtrate was treated with 2-5 drops of Ninhydrin solution placed in a boiling water bath for 1-2 min. and observed for the formation of purple color (Jyoti rani *et al.*, 2015).

Fourier Transform Infrared Spectroscopy (FTIR) Analysis

FTIR analysis was accomplished at Department of Chemical Technology in Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

RESULTS AND DISCUSSION

Qualitative phytochemical analysis

Phytochemical study covers the identification and characterization of crude drugs with respect to phytochemical constituents. The preliminary phytochemical screening of leaves and stems of *T. cordifolia* revealed the presence of different bioactive secondary metabolites which might be responsible for their medicinal attributes (Sama and Sivaraj, 2012). The present study reveals that a *T. cordifolia* plant shows the presences of different types of phytochemical are shown in Table 1. Alkanoids, Amino acid, Carbohydrate, Diterpenes, Resins, Phenols were present in both aqueous and methanol extracts of leaves and stems of *T. cordifolia*. Saponins were present just in Leaf aqueous and Stem aqueous extract. Flavonoids have been observed in all extract except Stem aqueous where as Tannins are present in all extract but absent in Stem methanol extract. Terpenoids have reported only in Stem methanol extract. Two types of metabolites were present in plant cells. They are primary and secondary metabolites. Growth and metabolism of plants were directly linked with primary metabolites (carbohydrates, lipids, vitamins, proteins, crude fibre and fats) (Dyduch and Najda, 2011). Secondary metabolites were considered as products of primary metabolites and are usually not involved in metabolic

Table 1: Phytochemical analysis of *T. cordifolia* leaves and stem extracts

Sr. No.	Chemical constituents	Test	Leaf Methanol	Leaf Aqueous	Stem Methanol	Stem Aqueous
1	Gums		-	-	-	-
2	Resins	Acetone water	+	+	+	+
3	Diterpenes	Copper acetate	+	+	+	+
4	Flavonoids	Lead acetate	+	+	+	-
		Alkaline reagent	+	-	+	-
5	Tannins	Braymer's	+	+	-	+
6	Terpenoids (phytosterol)	Salkowski's	-	-	+	-
7	Phenols	Ferric chloride	+	+	+	+
8	Saponins	Foam test	-	+	-	+
9	Cardiac glycosides	Keller kellini test	-	-	-	-
10	Alkanoids	Wagner's	+	+	+	+
11	Amino acid	Ninhydrin	+	+	+	+
12	Carbohydrate	Benedict's	+	+	+	+

+: Positive, -: Negative

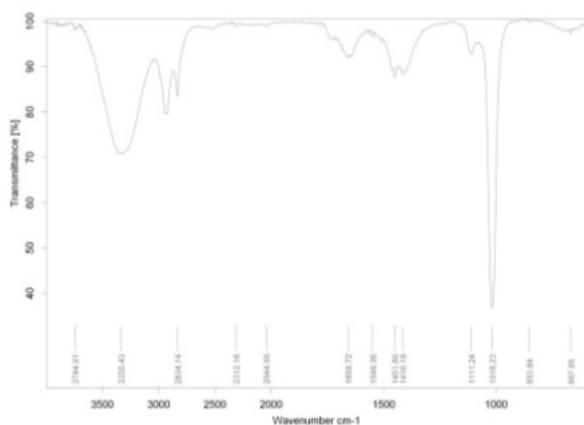


Figure 4. FTIR spectrum of Methanolic stem extract of *T. cordifolia*

Conclusion

In present study phytochemical investigation of *Tinospora cordifolia* was performed. It showed the presence of Resins, Diterpenes, Flavenoids, Phenols, Carbohydrate, Alkaloids and Amino acids. It is an important source of bioactive compounds that may supply new medicines. Further the FTIR analysis has recommended various functional groups associated with the reported phytochemicals.

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