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Evaluation of phytochemical potential on flower of *Peltophorum pterocarpum*

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Abstract

Phytochemical evaluation is a valuable step in the finding of bioactive composite present in medicinal plants. The *Peltophorum pterocarpum* flower extracts and its solvent fractionates was subjected to preliminary phytochemical screening using standard phytochemical tests. The aim of the present study was to investigate the presence of phytochemicals. Soxhlet apparatus was used for the organic solvent extraction. These investigations revealed the presence of flavonoids, tannins, saponins, carbohydrates, terpenoids, phenols, curcumins and glycosides in the flower of the plant extracts. The presence of various bioactive compounds confirms the application of *P. pterocarpum* for various ailments by traditional practitioners. However, isolation of individual phytochemical constituents may proceed to find a novel drug.

Keywords: *Peltophorum pterocarpum*, extraction techniques, phytochemical screening

1. Introduction

Medicinal plants are a source of great economic value all over the world. Nature has bestowed on us a very rich botanical wealth and a large number of diverse types of plants grown in different parts of the country^[1]. Plants are the source of large amount of drugs and used as medicine since from the time of immemorial. Phytochemicals are organic substances and could be obtained in both primary and secondary metabolic process. They are naturally synthesized in all parts of them plant body; bark, stem, root, flower, fruits, seeds, leaves etc.^[2-3]. The photochemical present in a flora may differ from one part to another. The most important bioactive constituents of plant are steroids, flavonoids, alkaloids, tannins, terpenoids, glycosides, etc. Antibiotics or antibacterial substances like saponins, glycosides, flavonoids, and alkaloids etc, are found to be distributed in plants^[4-6].

Peltophorum pterocarpum (DC.) K. Heyne (Copper pod, Yellow Flame Tree; Synonyms: *Peltophorum inermis* and *Peltophorum ferrugineum*) belongs to a family of fabaceae native to tropical southeastern Asia and a popularly ornamental tree grown around the world. It is a deciduous tree growing to 15–25 m (rarely up to 50 m) tall, with a trunk diameter of up to 1m. The leaves are bipinnate, 30-60 cm long, with 16-20 pinnae, each pinna with 20-40 oval leaflets 8 -25 mm long and 4-10 mm broad. The flowers are yellow, 2.5-4 cm in diameter, produced in large compound racemes up to 20 cm long. The fruit is a pod 5-10 cm long and 2.5 cm broad, red at first, ripening black, and containing one to four seeds^[7, 8]. The plant is used in different parts of the world for the treatment of several ailments like stomatitis, insomnia, skin troubles, constipation, ringworm, insomnia, dysentery, muscular pains, sores, and skin disorders and is the source of a diverse kind of chemical constituents such as aliphatic alcohols, fatty acids, amino acids, terpenoids, phenolics, flavonoids, alkaloids, steroids etc^[9-11]. In the present study, various solvent extracts of flower of *Peltophorum pterocarpum* were qualitatively screened for phytochemicals using standard tests.

Materials and Methods**Collection of plant materials**

The flower of *Peltophorum pterocarpum* was collected from Raipur area, C.G. in the month of March' 2017. The plant materials were taxonomically identified and authenticated by Botanical Survey of India (BSI), Central Regional centre, Allahabad (U.P.). A voucher specimen was deposited having the specimen Ref. No. 99616.

Processing of Plant Materials

The plant Materials was cleaned and shade dried until all the water molecules evaporated and the dried plant materials (petals of flower) was taken and grinded into coarse powder powdered.

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The powdered samples were stored in a clean glassware container until needed for analysis with proper labeling.

Preparation of plant extracts Solvent extraction

Crude plant extract was prepared by Soxhlet extraction method. About 20 gm of powdered plant material was uniformly packed into a thimble and extracted with 250 ml of different solvents separately. Solvents used were petroleum ether, chloroform, ethyl acetate, acetone methanol, ethanol and water as per polarity. The process of extraction continues for 24 hours or till the solvent in siphon tube of an extractor become colorless. After that the extract was taken in a beaker and kept on hot plate and heated at 30-40 °C till all the solvent got evaporated. Dried extract was kept in refrigerator at 4 °C for their future use in phytochemical analysis.

Qualitative phytochemical analysis

The extract was tested for the presence of bioactive compounds by using following standard methods [12-16].

Phytochemical Screening

Test for Alkaloids (Wagner's test)

A fraction of extract was treated with 3-5 drops of Wagner's reagent (1.27 g of iodine and 2 g of potassium iodide in 100 ml of water) and observed for the formation of reddish brown precipitate (or colouration).

Test for Carbohydrates (Molisch's test)

Few drops of Molisch's reagent were added to 2 ml portion of the various extracts. This was followed by addition of 2 ml of conc. H₂SO₄ down the side of the test tube. The mixture was then allowed to stand for two-three minutes. Formation of a red or dull violet colour at the interphase of the two layers was a positive test.

Test for Cardiac glycosides (Keller Kelliani's test)

5 ml of each extract was treated with 2 ml of glacial acetic acid in a test tube and a drop of ferric chloride solution was added to it. This was carefully underlayered with 1 ml concentrated sulphuric acid. A brown ring at the interface indicated the presence of deoxysugar characteristic of cardenolides. A violet ring may appear below the ring while in the acetic acid layer, a greenish ring may form.

Test for Flavonoids (Shinoda test)

To the extract, a few magnesium turnings and a few drops of concentrated hydrochloric acid were added and boiled for five minutes. Red coloration identifies the presence of flavonoids.

Test for Phenols (Ferric chloride test)

A fraction of the extracts was treated with aqueous 5% ferric chloride and observed for formation of deep blue or black colour.

Test for Phlobatannins (Precipitate test)

Deposition of a red precipitate when 2 ml of extract was boiled with 1 ml of 1% aqueous hydrochloric acid was taken as evidence for the presence of phlobatannins.

Test for Amino acids and Proteins (1% ninhydrin solution in acetone).

2 ml of filtrate was treated with 2-5 drops of ninhydrin solution placed in a boiling water bath for 1-2 minutes and observed for the formation of purple colour.

Test for Saponins (Foam test)

To 2 ml of extract was added 6ml of water in a test tube. The mixture was shaken vigorously and observed for the formation of persistent foam that confirms the presence of saponins.

Test for Sterols (Liebermann-Burchard test)

1 ml of extract was treated with drops of chloroform, acetic anhydride and conc. H₂SO₄ and observed for the formation of dark pink or red colour.

Test for Coumarin

Add 1mL of 10% Sodium hydroxide to 1mL of flower extract. The solution was observed for the appearance of yellow colour.

Test for Tannins (Braymer's test)

2 ml of extract was treated with 10% alcoholic ferric chloride solution and observed for formation of blue or greenish colour solution.

Test for Terpenoids (Salkowki's test)

1 ml of chloroform was added to 2 ml of each extract followed by a few drops of concentrated sulphuric acid. A reddish brown precipitate produced immediately indicated the presence of terpenoids.

Test for Quinones

A small amount of extract was treated with concentrated HCl and observed for the formation of yellow precipitate (or colouration).

Test for Oxalate

To 3 ml portion of extracts were added a few drops of ethanoic acid glacial. A greenish black colouration indicates presence of oxalates.

Results and Discussion

Results obtained for qualitative screening of phytochemicals in flower of *A. saman* are presented in Table 1. Of the fourteen phytochemicals screened for, ten were found present in various solvent extracts. They are cardiac glycosides, flavonoids, phenols, carbohydrates, saponins, tannins, curcumin, alkaloids and terpenoids. Remarkably, flavonoids, phenols, curcumin, quinones and terpenoids were present in the flower of these plants. This suggests that the flowers offer a wider array of phytochemicals.

In these screening process alkaloids, tannins, saponins, flavonoids and terpenoids, glycosides, phenols shows different types of results in different solvents. From the flower, water extract showed the presence of carbohydrate and tannin. However, 70% ethanol and acetone had cardiac glycosides, carbohydrates, flavonoids, phenol and terpenoids. The methanol extract had the presence of cardiac glycosides, carbohydrate, flavonoids, phenol, tannins, curcumin and terpenoids.

The medicinal value of plants lies in some chemical substances that have a definite physiological action on the human body. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. Alkaloids protect against chronic diseases. Saponins protect against hypercholesterolemia and antibiotic properties. Steroids and triterpenoids show the analgesic for central nervous system activities [17].

Table 1: Result of phytochemical evaluation of flower of *Peltophorum pterocarpum*.

S. N.	Phytochemicals/ Solvent Extracts	Pet. Ether	Chloroform	Ethyl acetate	Acetone	Ethanol	Methanol	Water
1	Alkaloids	-	-	-	-	+	-	+
2	Cardiac Glycosides	-	-	-	+	+	+	-
3	Carbohydrates	+	+	+	+	+	+	+
4	Flavonoids	-	-	-	+	+	+	-
5	Phenols	-	-	-	+	+	+	-
6	Phlobatannins	-	-	-	-	-	-	-
7	Proteins	-	-	-	-	-	-	-
8	Saponins	+	-	-	-	-	-	-
9	Sterols	-	-	-	-	-	-	-
10	Tannins	-	-	-	+	+	-	-
11	Curcumin	+	+	+	+	+	+	+
12	Terpenoids	-	+	+	+	+	+	-
13	Quinones	+	+	+	+	+	+	+
14	Oxalates	-	-	-	-	-	-	-

+ = present; - = absent.

The result indicates that *Peltophorum pterocarpum* flower hold promises as source of pharmaceutically important phytochemicals. Flavonoids generally present in areal parts like flowers play some metabolic role and control development in living system. They are also involved in protective function in animals and are used as medicine especially the flavonol glycosides. Tannins are known to inhibit pathogenic fungi. The flavonoids and phenolic compounds in plant have been reported to exert multiple biological effects including antioxidant, free radical scavenging abilities, anti-inflammatory, anti-carcinogenic etc.

[18].

Conclusion

Phytochemicals found present in flower extracts of *Peltophorum pterocarpum* indicates their potential as a source of principles that may supply novel medicines. Thus the plant studied can be used as a potential source of new useful drugs. The phytochemical characterization of the extracts, the isolation of responsible bioactive compounds and their biological activity are necessary for future studies. Further studies are therefore suggested to ascertain their antimicrobial, antiplasmodic and antihelminthic activities etc.

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