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Phytochemical Screening of Hydroethanolic Extract of Three Wild Indian Medicinal Plants

Gaurav Chandel[1], Anuja Chopra[2], Navpreet Kaur[3], Satwinder Kaur[4], Dr Sonia Singla[5*]

[1,2,3,4]Guru Har Gobind Khalsa College of Pharmacy, Gurusar Sadhar, Ludhiana, Punjab, India.
[5*]Associate Professor, Department of Pharmaceutical Chemistry, G.H.G. Khalsa College of Pharmacy, Gurusar Sadhar, Ludhiana, Punjab, INDIA.
Email id: soniaasingla786@gmail.com
*Corresponding author

ABSTRACT:

Medicinal plants are ironic in bioactive constituents that are exploited to heal and treat numerous human related ailments. Phytochemical constituents are accountable for the medicinal activity of plant species. Phytochemical screening is an important tool to identifying secondary metabolites present in particular medicinal plant. These are secondary metabolites that put significant value to the biological activity of any plant. The secondary metabolite can be an Alkaloid, Terpenoid, Saponin, Flavonoid or Phenolic compound or Tannins. Hence, in this present research work, phytochemical screening of leaf extract of some traditional medicinal plants, namely *Achyranthes aspera*, *Ficus benghalensis* and *Tephrosia purpurea* was carried out. The solvent extracts of the leaves of respective plants were prepared using the the cold maceration technique with 50% ethanol. After drying the marc, the material would be extracted again with water. The percentage yield of each extract would be recorded by comparing with the weight air-dried material. Phytochemical analysis of plants included tests for reducing sugars, Alkaloid, Terpenoid, Saponin, Flavonoid or Phenolic compound or Tannins. All tested phytoconstituents were found present in all three hydroalcoholic plants extracts. These phytochemicals may be a foundation of ground-breaking plant-based medications because their presence is associated with the therapeutic potential of these plants.

KEYWORDS: *Achyranthes aspera*; *Ficus benghalensis*; Phytoconstituents; *Tephrosia purpure*

5. INTRODUCTION

India is home to a vast diversity of plant species known for their medicinal properties. A significant portion of the population relies on these plants for traditional herbal treatments or as components in modern pharmaceuticals. In recent years, there has been growing scientific interest in exploring the therapeutic potential of these natural resources. Advancing research in medicinal plants requires collaborative efforts across various disciplines, including ethnobotany, ethnomedicine, ethnopharmacology, and phytochemistry. Medicinal plants provide us diversified, reasonably safe and huge variety of therapeutic agents in comparison to manufactured pharmaceuticals. More than 80% of the world's population in developing and underprivileged nations used plant-based drugs according to World Health Organization. The WHO recognized over 20,000 species of medicinal plants internationally. The mandate for plants initiated raw materials is increasing at a rate of 15% to 25% annually and is probable to upsurge by US$5 trillion by the year 2050. The approximation of total trade by therapeutic florae is approximately US $ 1 billion annually in India [1]. So, the present study was designed to include the preliminary phytochemical analysis of 50 % hydroethanolic extracts of three wild Indian medicinal plants i.e. *Achyranthes aspera*, *Ficus benghalensis* and *Tephrosia purpurea.*

Achyranthes aspera. It is an upright, annual herb about 2-meter-high with a forested base and purple colored stems simple or branched from the pedestal, angular, ribbed and eminent traditional healer. Crushed dry plant water extract is used as tranquillizer and in pneumonia. It possesses hepatoprotective, antiviral, anti-arthritic, spermicidal, anti-fertility, anti-inflammatory activity and contains triterpenoid saponins oleanolic acid as aglycone, vitamin A, B, C & D with ecdysterone (insect molting hormone), Achyranthine, Betaine, a water-soluble alkaloid has also been isolated [2-9].

Ficus benghalensis. A giant evergreen 23-34 m tall tree with numerous spreading limbs supported by above ground roots which upon maturity form accessory trunks extending to a large area and corpulent, softly juvenile branchlets. This tree is a blotch of peace and harmony. The latex of this plant is aphrodisiac, tonic, maturant, also lessens the inflammations so useful in piles, nose-diseases, gonorrhea. Majorly it contains essential amino acids arginine, methionine, citrulline and hydroxyproline (not in Free State). Fruit contains glutathione in lofty amount with protein cysteine. it is hypolipidemic, hypoglycemic, antidiarrheal, antidiabetic, ameliorative, antioxidant, antistress and anti-allergic, immunomodulatory in nature [10-21].

Tephrosia purpurea. It is a rigid, calendar and transitory perpetual herb up to 40-80 cm height, sometimes wild, stem slender, stiff or decumbent at base. It is an effective remedy for external wounds, gastrointestinal disorders, liver, kidney, spleen, heart, blood related disorders. Dried powder of herb

is used in bronchitis, bilious febrile attack, constipation, boils, rashes, pimples and piles. Rutin, quercetin, deguelin, elliptone, rotenone, tephrosin and lupeol are the most important constituents that are present in high amounts [22-29].

6. MATERIALS AND METHODS

Collection of plant materials

Leaves of *Achyranthes aspera* collected from road side near Deepak hospital, Ludhiana, Punjab. Leaves of *Tephrosia purpurea* collected from fields, khokhar road, near railway line, Mansa, Punjab. Leaves of *Ficus benghalensis* collected from home garden, Power Colony, Ludhiana, Punjab. Verification of all plant parts was done by NISCAIR, Delhi with authenticated numbers (NISCAIR/RHMD/3215-16-4, NISCAIR/RHMD/3246-47-1, NISCAIR/RHMD/3246-47-3 for *Achyranthes aspera*, *Ficus benghalensis* and *Tephrosia purpurea* respectively.

Preparation of extracts

All plant parts are shade dried and milled into coarsely powdered form. Each plant part powder was extracted with 50% ethanol through maceration technique. Minimum 500g quantity of each plant part was taken, dried, powdered and kept in contact with solvent in a stopper container for 3 days. Frequent agitation was done to dissolve matter properly. After 3 days filter the extract and dry the marc. Again, extract the marc with water and extract was concentrated by rotary vacuum evaporator and evaporation done until it completely dry. After that percentage yield of hydroethanolic extract for each plant was calculated by the formula W1(weight of residue after solvent evaporation) x100/ W_2 (weight of powder taken initially).

Qualitative phytochemical analysis [30-33]

The qualitative analysis of phytochemicals was done with three plants 50% hydroethanolic extracts.

Carbohydrates

Mono-saccharides are constructing lumps of carbohydrates. Carbohydrates additionally known as polysaccharides, which upon hydrolysis beneath mineral acid organization deliver small, unmarried strategies of monosaccharides. These are optically lively and deliver special shadeation reactions and identity tests.

Molish test. Two ml extract answer joint with to a scarce drip of Molish (α naphthol) reagent and focused Sulphuric acid (H2SO4) brought sideways the wall of the take a look at tube, that come to be the purpose for improvement of pink coloured ring at junction.

Fehling solution test. Most normally used checked for decreasing sugar. Grouping of same quantity of Fehling answer, A entails of 0.5% of copper sulphate and some other is Fehling answer B (sodium potassium tartrate). Both jumbled together situation, 1 ml of Fehling answer A and 1 ml of Fehling answer B have been jumbled together 2ml of aqueous answer of extract and boil for ten mins on warm water tub. Reddish tinge brown colored precipitate took place because of creation of (cuprous oxide).

Benedict's test. Generally, for trying out of lowering molecules of sugar. It is serene of especially copper sulphate (CuSO4) and sodium hydroxide (NaOH). To the two ml aqueous answer of extract, 1 ml Benedict answer introduced and heated as much as boiling temperature. inexperienced color precipitate sedentary on base befell because of formation cuprous oxide.

Lipids

Biuret test. Biuret reagent is the mixture potassium hydroxide added with Copper sulphate and salt of sodium potassium tartrate. Two to three droplets were added to aqueous solution of extract. Violet color formed.

Alkaloids

Dragendroff's test. Sodium iodide brought into 5.2 gram of Bismuth carbonate in fifty-milliliter of freezing acetic acid and sweltering achieved for 5 minutes. After that allowed to face for entire night. The triggers had been stable on base and filtered off. Ethyl acetate and water had been brought to the filtrate. Then twenty-milliliter of acetic acid turned into brought and quantity turned into made as much as one hundred ml with water. Extract turned into brought to this solution, reddish ppt formed.

Mayer's test. Dissolve mercuric chloride in purified water (A) and 5 gram of potassium iodide (KI) in purified water (B). Mix each Solutions, Solution A and B and quantity adjusted to a hundred ml with water observed via way of means of totaling of extract. Cream shadeation precipitate confirmed the incidence of alkaloid in extract.

Hager test. Solution of acid (10 mg picric acid in a hundred cc of purified water) additional in answer of extract created yellow color precipitates because of alkaloids.

Wagner's Test. Take one gram of iodine and a couple of grams of potassium iodide (KI) in 5 ml of purified water and the extent of answer become made as much as one hundred ml with water. Add 2 ml of extract option to this iodine answer, reddish brown precipitate fashioned because of the alkaloids.

Glycosides

Borntragor's test. Five to 10 ml of watery hydrochloric acid changed into transported in about half gm of extract and boiled on warm water tub for ten minutes. Solution changed into filtered and filtrate changed into mined with solvent benzene and ammonia answer. Red shadeation changed into received in ammonia layer at the higher a part of answer that imply the lifestyles of anthraquinone glycosides.

Keller Killani test. Equal quantity of alcoholic answer of extract and water mixed, upload half milliliter of lead acetate robust answer. Strain the answer and remainder changed into extracted with equivalent quantity of chloroform. Chloroform evaporated with the assist of rotavapour to aridness and remainder left after vanishing liquefied in 3 ml of glacial acetic acid with totaling of to 3 drips of ferric chloride answer. The ensuing answer relocated to a patterned tube comprising ml of focused sulphuric acid. Reddish brown layer shaped on top facet which became to bluish inexperienced after status because of presence of digitoxose.

Saponin

Foam test. About half grams of extract brought in ten to twenty ml of water and dazed dynamically for limited minutes. Froth formation befell which persevered from sixty to hundred seconds.

Steroids

Libermann Bruchard test. Alcoholic abstract of plant mined with chloroform and upload limited droplets of focused Sulphuric acid together with the aspect of the barrier of check tube. Mauve purplish disk fashioned on the junction of liquid.

Salkowaski's test. 2 ml of answer of extract dazed with focused Sulfuric acid and on status produce pink color.

Flavonoids

Ammonia test. Add five ml of dilute Ammonium hydroxide solution to a minor portion of aqueous solution of extract that was sieved and tracked by addition of concentrated Sulfuric acid. Yellow shadeation look shows the prevalence of flavonoids in extract.

Lead acetate test. To 2 ml of abstract, 1-2 dewdrops of lead acetate answer bowed into delivered and stir, yellow precipitate establishment indicated the lifestyles of flavonoids.

Phenolic compounds

Ferric chloride test. 1 ml of extract answer changed into dealt with 10 % ethanolic ferric chloride answer. Arrival of greenish colour designated the attendance of phenolic compounds.

Terpenoids

Tschugajen test. Two ml extract answer blended with extra quantity of acetyl chloride then a squeeze of zinc chloride, heat up on warm water tub that fashioned eosin purple color.

Amino acids and proteins

Ninhydrin test. 2 to five drops ninhydrin answer brought into 2 ml filtrate and boil on water tub for 3 to 5 minutes. Development of red shadeation indicates the existence of amino acid and proteins.

Tannins

Ferric chloride test. Two ml of 5 % ferric chloride solution was added to one ml of extract solution, green color fashioned which indicated the incidence of tannins.

Quinones

One ml of concentrated Sulfuric acid was added to one ml of extract solution. Red color formed.

Coumarins

One ml of 10 percent weight/volume of sodium hydroxide answer turned into introduced in to the only ml of plant extract answer. Formation of yellow color take place when coumarin present in the sample.

Anthocynins and betacynins

One ml of two normal sodium hydroxide (NaOH) introduced into 2 ml of extract answer and heated for 5 mins at 100^{o} C. Yellow color regarded on the end.

Gums and mucilage

To one ml of filtrate of extract, 2.5 ml of alcohol was added with endless stirring. The formation of precipitate specified the existence of gums and mucilage.

7. RESULTS AND DISCUSSION

The Phytochemical analysis of 50 % hydroethanolic leaves extracts of *Achyranthes aspera*; *Ficus benghalensis*; *Tephrosia purpurea* summarized in Table 1, which shows the presence of medically active compounds in all plants. Percentage Yield with colour of extracts summerised in Table 2. *Achyranthes aspera* leaves contains carbohydrates, alkaloids, lipids, saponins, steroids, flavonoids, phenols, Amino acids and proteins, Terpenoids, Gums and mucilage. *Ficus benghalensis* leaves contains alkaloids, lipids, flavonoids, phenols, tannins, Amino acids and proteins, Terpenoids. *Tephrosia purpurea* leaves contains carbohydrates, lipids, saponins, steroids, flavonoids, phenols, tannins, Terpenoids, Gums and mucilage. Study confirm about the presence of most of the phytoconstituents in all plant extracts.

Table 1: Phytochemical analysis of 50 % hydroethanolic leaves extracts of *Achyranthes aspera*; *Ficus benghalensis*; *Tephrosia purpurea*

Phytochemicals	**Test**	***Achyranthes aspera***	***Ficus benghalensis***	***Tephrosia purpurea***
Carbohydrates	Molish	+	-	+
	Fehling solution	-	-	+
	Benedict's	-	-	+
Alkaloids	Dragendroff's	-	+	-
	Mayer's	+	+	-
	Hager	-	+	-
	Wagner's	+	+	-
Lipids	Liberman-Burchard Test	+	+	+
Glycosides	Borntragor's	-	-	-
	Keller Killani	-	-	-
Saponin	Foam test	+	-	+
Steroids	Libermann Bruchard	+	-	+
	Salkowaki's	+	-	+
Flavonoids	Ammonia	+	+	+
	Lead acetate	+	+	+
Phenols	Ferric chloride	+	+	+
Tannins	Ferric chloride	-	+	+
Amino acids and proteins	Ninhydrin	+	+	-
Terpenoids	Tschugajen test	+	+	+
Gums and mucilage	Alcohol test	+	-	+

+ Sign indicates the presence of particular constituent

- Sign indicates the absence of particular constituent

Table 2: Percentage Yield with Colour of Extract

Sr. no.	Plant name	Color of extract	Percentage yield (g)
1.	*Achyranthes aspera*	Greenish brown	7.60
2.	*Ficus benghalensis*	Whitish brown	6.76
3.	*Tephrosia purpurea*	Greenish	9.6

8. CONCLUSION

The majority of the biologically active phytochemicals were found to be present in all the three wild growing medicinal plants extracts of leaves of *Achyranthes aspera*, *Ficus benghalensis*, *Tephrosia purpurea.* From all the three plants *Ficus benghalensis* was more phytochemically rich in alkaloids. The all medicinal plants were found rich in context of secondary metabolites, which are usually hired in conservative medicine to treat and combat an extensive range of illnesses like antispasmodic, anti-inflammatory, analgesic, diuretic and many other properties can be imputed to their high availability of polyphenols, flavonoids, tannins, terpenoids, steroids, glycosides, coumarins, and reducing sugars. Our research has validated the therapeutic potential of these plant species. Further investigation, particularly in the area of quantitative analysis of their phytochemical constituents, would be highly beneficial. The findings from our study provide a scientific foundation that can support the development and formulation of various medicinal products.

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Conflicts of Interest

There is no conflict of Interest.

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