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PHYTOCHEMICAL PROFILING AND THERAPEUTIC POTENTIALS OF MESUA FERREA

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Abstract: The methanolic extracts of leaves and flowers of Mesua Ferrea have exhibited significant broad spectrum antimicrobial activity. Further work is being carried out to isolate and identify the active constituents of the plant responsible for antimicrobial activity. The purpose of our research was methanolic extract of the plant was qualitatively investigated for phytochemicals using standard procedures which revealed the presence of various important bioactive chemical entities.

Keywords: bioactive, phytochemicals, Mesua Ferrea.

1. INTRODUCTION

Traditional medicines for human diseases have been widely used in many parts of the world. Herbal plants are usually the primary source of medicine in many developing countries. Natural product compounds from plants provide biologically active compounds. Mesua ferrea Linn. belonging to the family Clusiaceae (Guttiferea) is known in Hindi as 'Nagkeshar' and in English as Ceylon Ironwood. It is a medium to large evergreen tree with short trunk, often buttressed at the base, found in the Himalayas from Nepal eastward, in north-eastern India it occurs in dry hilly forests of Rajasthan, Madhya Pradesh, Gujarat, Bihar, Assam, Orissa, Deccan Peninsula and the Andaman Islands, ascending to an altitude of 1.500m. The different parts of the plant contain glycosides, coumarins, flavanoids, xanthones, triglycerides and resins. Specifically, it contains α -copaene and germacrene D, ve β-amyrin, β-sitosterol, and a new cyclohexadione compound named as mesuaferrol (I), mesuanic acid (13), triterpenoids and resins, reducing sugars, and tannins, saponins, Mesuaferrone B, mesuol etc.

2. METHODS

Phytochemical investigation of plant extract was carried out using standard procedure to identify carbohydrates, amino acids, alkaloids, steroids, glycosides, flavonoid etc.

Plant materials

The plant used in the study was collected from Pachmarhi district Hoshangabad Madhya Pradesh. It is authenticated by Dr. J. Anuradha (Department of Botany), NIET, NIMS University, Jaipur, Rajasthan. The collected plant materials were cleaned, shade dried, powdered coarsely in a blender and then stored in air-tight containers for further use.

Preparation of extracts:

A known weight (20 g) of the powdered plant part was extracted with 70% methanol for 30 hours in a Soxhlet apparatus. The obtained extracts were then filtered to remove residual parts of the precipitate. It was then

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evaporated at room temperature to get a crude dried extract. The dried extracts were weighed to determine the yield. It was stored in a deep freezer at - 20°C to prevent the loss of biological activity until used.

Preliminary qualitative phytochemical investigation:

Qualitative phytochemical analysis of the methanolic extract was carried out using standard procedures to identify alkaloids

(Mayer's test), steroids and terpenoids (Liebermann's and Salkowski tests), cardiac glycosides (Keller-Kiliani test), saponins (foam test), flavonoids (Shinoda test), phenols and tannins (Ferric chloride test, Gelatin test), Reducing sugars (Benedict's test), Protein (Biuret test), Amino acid (Ninhydrin test), Carbohydrates (Molisch's test), Vitamins (Paget's test).

TEST	EXPERIMENT	OBSERVATION	INFERENCE
Biuret test	2ml extract solution mixed with 5% NaOH and few drops of 2% CuSO4 solution.	Violet/pink color observed.	was Presence of protein.
Ninhydrin test	3 ml of each extract was mixed with 6ml of Ninhydrin reagent. Heated gently if needed.	Blue color appears.	Presence of amino acid.

TEST	EXPERIMENT	OBSERVATION	INFERENCE
Benedict's test	1ml of extract and 1ml of Benedict's reagent mixed in a test tube and heated in boiling water bath for 10min.	Orange red precipit	Presence of sugars.

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		ate was obtained.	
Molisch's test	1 ml of each extract was mixed with 1 ml of alcoholic alpha naphthol solution in the test tube and add conc. H2SO4.	Formation of the violet ring at the junction.	Presence of carbohydrates.
Keller-Killiani test.	2 ml of each extract was mixed with 1 ml of glacial acetic acid and a drop of ferric chloride solution. Concen-trated sulphuric acid was added along the sides of the test tube.	Reddish brown color at the junction of two liquids and bluish green on upper layer.	Presence of cardiac glycosides.
Gelatin test	Extract was dissolved in 2% gelatin and then add 1ml of 10% NaCl solution.	White precipitate formed.	Presence of tannins.

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Liebermann's test	2 l of acetic anhydride was added to 1 ml of ethanolic solution of each extract and acidified with 3 l of concentrated sulphuric acid.	Color change from violet to blue or green.	Presence of steroids.
Ferric chloride test	125 mg of the powdered plant samples were boiled in 5 ml of water and then filtered. A few drops of freshly prepared 0.2% ferric chloride were added to 3 ml of the filtrate.	Appearance of a blue-black color.	Presence of phenols and tannins.
Paget's test	5ml extract was added in 2.5ml chloroform and mixed 2.5ml of SbCl3 solution.	Transient blue color was observed.	Presence of vitamin A.
Foam test	About 125 mg of the powdered sample was boiled with 5 ml of distilled water and	Formation of stable persistent foam.	presence of saponins

TEST	EXPERIMENT	OBSERVATION	INFERENCE
	filtered. 1 ml of the filtrate was mixed with 5 ml of		

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	distilled water and shaken vigorously till frothing.		
Shinoda's test	In a test tube, 5mg of the extract was dissolved in 1ml of ethanol, to which 4 drops of dilute hydrochloric acid and 0.5 mg of magnesium turnings were added.	The formation of pink, reddish pink color.	Presence of flavonoid.
Mayer's test	1ml of the extract solution, 5 drops of dilute hydrochloric acid and 0.5 ml of (Mayer's reagent) potassium mercuric iodide solution were added.	Whitish creamy precipitate was obtained.	Presence of alkaloids.
Salkowski's test	5 ml of each extract was mixed with 2 ml of chloroform. To this mixture, 5ml of concentrated sulphuric acid was carefully added along the sides of the test tube.	A reddish brown band in the chloroform layer and acid layer shown greenish yellow color.	Presence of terpenoids.

3. RESULT AND DISCUSSION

Mesua Ferrea plant is a significant medicinal plant in Indian traditional medicines. This medicinal plant is commonly used in Ayurveda and Allopathy. The main aim of this study was, consequently to carry out preliminary phytochemical investigation of Mesua Ferrea plant. The curative properties of medicinal plant are due to the presence of various secondary metabolites. Thus, the preliminary investigation tests may be useful in the detection of the bioactive principles and subsequently may lead to drug discovery and development. The result of the phytochemical investigation of methanolic extract of the plant parts is given in (Table)

The phytochemical investigation of methanolic extract of the leaves and flowers of *Mesua Ferrea* revealed the presence of carbohydrates, proteins, amino acids, cardiac glycosides, saponins, flavonoids, tannins and phenols, terpenoids, and alkaloids.

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of *Mesua Ferrea* revealed the presence of cardiac glycosides, Terpenoids and alkaloids, saponins, flavonoids, tannins and phenols.

Table - Phytochemical investigation of methanolic extracts of plant parts

Phyto-chemicals	**Name of test**	**Methanolic extract of the plant parts**	
		Mesua Ferrea **(leaves)**	*Mesua Ferrea* **(flowers)**
Sugars	Benedict's test	+	+
proteins	Biuret test	+	+
Amino acids	Ninhydrine test	+	+
Carbohydrates	Molisch's test	+	+
Cardiac Glycosides	Keller Killiani test	+	+
Tannins	Gelatin test	+	+
Phenols	Ferric Chloride test	+	+
Steroids	Liebermann's test	+	+
Terpenoids	Salkowski's test	+	+
Alkaloids	Mayer's test	+	+
Flavonoids	Shinoda test	+	+
Saponins	Foam test	+	+
Vitamins	Paget's test	-	-

(+) Presence of phytochemical (-) Absence of phytochemical

4. CONCLUSION

It is concluded that this study would lead to the establishment of some valuable compound that has to be used to formulate new, different and more potent drugs of natural origin. The present study shows that the methanolic and aqueous extract of leaves of Mesua Ferrea have the all- phytochemical constituent studied with negligible variation. In recent times there has been great attention in the use of plant material as another method to control pathogenic microorganism and many components of plant products have been shown to be specially targeted against resistant pathogenic bacteria. The emergence of multidrug resistant strain of many pathogens is a serious threat and makes chemotherapy more difficult. Moreover, the current cost of most of the chemotherapeutic agents is unbearable to the public especially in developing countries like India. Thus, attempts must be directed towards the development of effective natural, nontoxic drug for treatment.

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