



SECONDARY METABOLITES OF ETHANOLIC LEAF EXTRACT OF *GREWIA HIRSUTA*

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Article Received on 21/11/2017

Article Revised on 11/12/2017

Article Accepted on 01/12/2017

ABSTRACT

A number of species of genus *Grewia* have been used as medicinal agents to treat several diseases. The large flowering plant genus *Grewia* is belongs to family Tiliaceae and reported for its medical importance. Various parts of different species exhibit different medicinal importance and yet to be phytochemically investigated. Triterpenoids, steroids, glycosides, flavones, lignanes, phenolics, alkaloids, and organic acids have been isolated from various species of this genus. The extract and preparation from various species exhibited various biological effects, e.g. antioxidant, anti-bacterial and analgesic effect. The plant *Grewia hirsuta* have phyto chemical like flavonoids, saponins, alkaloids and tannins.

KEYWORDS: Flavonoids, *Grewia hirsuta*, Phyto, Steroid, Saponins.

Taxonomic position of *Grewia hirsuta*

Kingdom: Plantae
Phylum: Charophyta
Class: Equisetopsida
Subclass: Magnoliidae
Super order: Rosanae
Order: Malvales
Family: Malvaceae
Genus: *Grewia*
Species: *hirsuta*

INTRODUCTION

The genus *Grewia hirsuta* belongs to Tiliaceae family. This genus comprising shrubs and trees and is distributed in the warmer parts of the world. There are 40 species of genus are present in India. Among them some have medicinal value.^[1-3]

The different parts of different species of genus *Grewia* are used as folk medicine in the different part of globes. Diverse bioactivity studies on different species of genus *Grewia* have been reported. Various parts of *G. hirsuta* are used in headache, eye complaints, sores and cholera while ethanolic extract of stem bark exhibited antiviral and diuretic activity.^[4,5] The leaves are useful in nose and eye diseases, treating splenic enlargement, piles, rheumatism and relieving joint pain while the roots are used in diarrhea, dysentery and as a dressing for wounds.

Grewia hirsuta is a shrub with coarsely gray, brown colored hairy branches. Stalks of the leaves of this plant are 3 mm long. The Leaves are of lance shaped with 6-14

cm length and 2-3.5 cm width. These leaves are of black-brown color when dried. The lateral basal veins of the leaves are as long as the leaf blade and the lateral veins occur in 4 to 5 pairs. The Flowers of this plant are white in color and are borne in cymes (3 to 4 flowers per cyme). Stalk of this flowers are 3-5 mm in length. Bracts are also 3-5 mm in length with lance shaped. Petals are narrowly ovate. The flowering period of this shrub is June to July. White colored flowers of this plant gradually turns into yellow colour and then turns into brown colour when fully grown. The buds of these flowers are globose. The fruits of this shrub are small in size and are of yellow color. The fibrous roots are cylindrical in shape, with brown colored external surface.

Occurrence of *Grewia hirsuta*: This plant is found in East Asia such as India, Srilanka, Thailand, Myanmar, Vietnam, etc. In India, it is usually found in Vindhya regions like eastern U.P, Bihar and Rajasthan. It is generally found in mixed deciduous and dry evergreen forests.



Plant *Grewia hirsuta*

MATERIALS AND METHODS

Plant Collection and Direct Extraction: The fresh leaves of plant *Grewia hirsuta*, were collected from Dolas Nagar hills of eastern Ghats Near Mangalagiri, Andhra Pradesh. The collected plant leaves were shade dried for 2 weeks, coarsely powdered, and subjected to direct extraction.

Extraction of plant material: Coarsely powdered leaves were subjected to direct extraction using solvents of varying polarity such as ethanol, by following the method of Eloff (1998).^[6] 10g of each leaf powders was immersed in 100ml of respective solvents (1:10 w/v) and kept under shaking condition for 24hrs with intermittent filtration. The filtrates were collected and condensed to obtain the crude extract.



Plant extraction through soxlet apparatus

Determination of total phenols: The total phenolics contents in different solvent extracts were determined using Folin-Ciocalteu's reagent (FCR) following the assay of Damodar (2011)^[7] with small modifications. 0.5

ml of the extract was mixed with 0.1ml FCR (diluted 1:2 v/v), incubated for 15min, followed by the addition of 2.5 ml of saturated sodium carbonate solution. The final volume of the tubes was made up to 10 ml with distilled water, allowed to stand for 30 min at room temperature and the absorbance was measured at 750nm. A calibration curve was constructed using gallic acid solution as a standard and total phenolic content of the extract was expressed as a Gallic Acid Equivalents/g sample.

Estimation of Total Flavonoids: Total flavonoid content was determined by Aluminium chloride method using Quercetin as a standard. 1ml of the methanol extract of *Grewia hirsuta* was added to 4 ml of distilled water and incubated for 5min. After incubation, 0.3 ml of NaNO₂ (5%) and 0.5 ml of AlCl₃ were added and the mixture was re-incubated at room temperature for 6 min followed by the addition of 0.5ml of 1M NaOH. The final volume was made up to 10ml with distilled water and the absorbance of the reaction mixture was measured at 510 nm.^[8]

Estimation of Total Alkaloids: The total alkaloid content of *Grewia hirsuta* was estimated using the method of Harborne. 5 g of the sample (leaf powder) was weighed and added to 200 ml of acetic acid (10% in ethanol), covered and allowed to stand for 4h. The solution was then filtered and the filtrate was concentrated on a water bath to one-quarter of the original volume. To the concentrate, NH₄OH was added drop wise until the precipitation was complete. The whole solution was allowed to settle down and the precipitate was collected, washed with dilute ammonium hydroxide and filtered. The residue is the alkaloid, which was dried and weighed.

Estimation of total Saponins: Powdered sample (20 g) was treated with 100 mL of 20% aqueous ethanol, heated over a hot water bath for 4 h at about 55°C with continuous stirring. The mixture was filtered and the residue re-extracted. The combined extracts were reduced to 40 mL over water bath at about 90°C and the concentrate was transferred into a separating funnel and 20 mL of diethyl ether was added and shaken vigorously. The aqueous layer was recovered while the ether layer was discarded. The purification process was repeated and 60 mL of n-butanol was added to the combined extracts and washed twice with 10 mL of 5% aqueous NaCl. The remaining solution was heated in a water bath, dried in an oven to a constant weight and the saponin content was calculated as percentage.^[9]

RESULTS AND DISCUSSION

Extracts of *Grewia hirsuta* were obtained using different solvents of varying polarity such as ethanol and aqueous solvents. These extracts were filtered, re-extracted with same solvents, respectively, condensed to dryness to obtain crude extracts.

Phytochemical Evaluation

	Ethanol	Aqueous
Alkaloids	++	+
Flavonoids	++	++
Saponins	++	++
Tannins	++	++
Glycosides	++	++
Antraquinone glycosides	++	+
Carbohydrates	++	+
Decorboxy sugars	+	+
Reducing sugars	+	+
Proteins	++	+
Amino acids	+	-
Triterpenoids	+	+
Phenolic compounds	+	++
Steroids	+	+

DISCUSSION

Table present above reveals the phytochemical constituents of *Grewia hirsuta*. It shows that saponins, tannins, cardiac glycosides, alkaloids, anthraquinones, steroids, carbohydrates, reducing sugars, amino acids, phenolic compounds and flavonoids are present in the plant. This indicates the efficacy of the plant for medicinal uses. Phytochemically, the genus *Grewia* has been found to possess mainly triterpenoids, fatty component, flavonoids, steroids, saponins and tannins.

CONCLUSION

Grewia hirsuta, the versatile genus of medicinal plant is the unique source of various types of compounds having diverse chemical structure. A very little work has been done on the biological activity and possible medicinal application. It is very useful traditional plant genus, crude extract from various part of various species have a therapeutic uses from time immemorial, so that some active constituent can developed for future studies. The global scenario is changing their face towards herbal medicinal uses due to less side effect and emphasis given to develop a modern drug to cure many acute diseases.

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