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# PHYTOCHEMICAL PROFILING OF CRUDE EXTRACTS FROM *RADERMACHERA XYLOCARPA* (ROXB.) K. SCHUM.

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## ABSTRACT

Extinction is a natural phenomenon which costs loss of around nine percent of the species every million years . Medicinally important plants are facing threat of extinction due to various reasons like habitat destruction, illegal trade and over exploitation in addition to climate change. These plants may vanish without complete knowledge of its biochemical attributes which endow them potential to cure numerous diseases. This has urged to study the complete phytochemical profile of such RET species to explore its appropriate medicinal value and the biomolecules behind those properties. Qualitative phytochemical investigation of plant parts like bark, wood, leaves and pods of *Radermachera xylocarpa* (ROXB.) K. SCHUM. was carried out with five different solvent extracts. Overall analysis revealed absence of tannins in almost all plant parts with the exception of water and ethanol extracts from the leaf. The alkaloids, steroids, terpenoids, cardiac glycosides, flavonoids, triterpenoids, etc. were reported in various plant parts in different extraction systems.

**KEYWORDS:***Radermachera xylocarpa*, **Phytochemical Profiling, RET species, Medicinal plant.**

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# INTRODUCTION

Phytochemistry is a branch of science that deals with the study of chemicals obtained from plants with desirable biological activities[1]. These phytochemicals are mainly the secondary metabolites offering medicinal attributes to the plants. Amongst the indefinite plants claimed for their medicinal potential, *Radermachera xylocarpa* belonging to family Bignoneaceae is screened for its biochemical contents. It is tree with compound leaves and long dehiscent pods. The pod appears "Snake"y with irregularly placed tubercles on the surface and slightly curved apex. Seeds many, winged, light, creamish – yellow, attached to hard cord like replum. In case of snake bite, seeds are made in to paste and applied on bitten part as well as taken orally[2]. The plant species under present study is located in "Melghat" forests. It is used by local tribal communities to repel snakes from homes and preparation of antidotes.[3]

# MATERIALS AND METHODS

### *(i) Collection of Plant Sample*

Plant material was collected in the month of October, 2012 from Khamla Road, Melghat (GPS location - 21.461217,77.43762). The species was identified and authenticated by Taxonomy laboratory, GVISH, Amravati. The material was thoroughly washed under running water and shed dried.

### *(ii) Processing of plant material*

The bark from the dried stems was removed. Wood, bark (old stem), leaves and pods ground separately into fine powder using an electric blender. The powder was tested for the presence of various phytochemicals.

### *(iii) Extraction*

Each powdered plant material was subjected to successive solvent extraction. Five different solvents systems viz. water, methanol, ethanol, chloroform and acetone were used to study phytochemical profile. Proportion of material to solvent was taken as 1:10 (ww/vv). Material soaked for 72 hrs. in umber colour bottles and filtered with Whatmann filter paper no. 1. Extracts obtained from bark, wood, leaves and pods were subjected to qualitative analysis to explore the phytoconstituents such as tannins, alkaloids, saponins, terepenoids, cardiac glycosides, phytosteroids, flavanoids, triterpenoides, glycosides, reducing sugars, phlobatanins, anthraquinones, leucoanthocyanins, fatty acids, coumarins and emodins using the standard protocols [4,5,6,7]

### *Phytochemical Tests*

### *Tannins [8]*

To the 2 ml of extract, 2 ml FeCl3 was added. Colour change from blue to black indicates presence of tannin.

### *Alkaloids*

2 ml extract was hydrolyzed by 1% HCl, addition of Mayer's, Wagner's, Dragendorff's reagent individually to each of sample produces creamish, brown, red / orange precipitates indicates presence of alkaloids.

### *Saponins*

0.5 ml of extract was shaken well with 5 ml of distilled water, persistent frothing indicates presence of saponins.

### *Terpenoids (Salkowski test)*

2 ml of Chloroform was added to 0.2 ml of extract and concentrated $H_2SO_4$ was added from sides of the test tube. Appearance of reddish – brown coloration at interface denotes presence of terpenoids.

### *Cardiac glycosides (Keller - Killiani test)*

To the 2 ml of extract, 1ml of glacial acetic acid and a few drops of $FeCl_3$ were added and concentrated $H_2SO_4$ added from the sides of test tube, green, blue precipitate shows the presence of cardiac glycosides.

### *Steroids (Salkowski test)*

To the 2 ml chloroform and 0.5 ml extract, concentrated $H_2SO_4$ was added from sides of the test tube to form lower layer, reddish – brown coloration at interface reveals the presence of steroids.

***Flavonoids***[9]
When dilute sodium hydroxide was added to 0.2 ml of extract creates intense yellow colour, which on addition of HCl turns colourless suggests presence of flavonoids.

***Triterpenoids***
100 µl extract was mixed with 1 ml of chloroform and later 1 ml of acetic anhydride was added followed by 2 ml of concentrated $H_2SO_4$ from sides of the test tube creating reddish violet color, infers the presence of triterpenoids.

***Glycosides***
Extract was hydrolysed by HCl and neutralized with NaOH followed by addition of Fehling's solution A and B in 1:1 proportion, produces a red precipitate, indicating presence of glycosides.

***Reducing Sugars (Fehling's Test)***
Extract shaken with distilled water and filtered, it was boiled on the addition of Fehling's solution A and B in equal quantity, appearance of orange red precipitate positively detects reducing sugars.

***Phlobatanins***
Distilled water was added to extract, shaken and filtered, 2% HCl added and boiled, development of red color confirmed phlobatanins.

***Anthraquinones (Borntrager's test)***
To the 1 ml extract 10 ml benzene was added and shaken vigorously followed by filtration and the addition of 5 ml of 10% ammonia and shaken again, the appearance of pink/red/violet coloration in ammonia layer indicates anthraquinones in the extract.

***Leucoanthocyanins***
5 ml of isoamyl alcohol was added to an equal volume of extract, if an upper layer turns red, shows that leucoanthocyanins reside here.

***Fatty acids***
5 ml of extract was added to 5 ml of ether and poured on filter paper placed in petri dish, on evaporation of ether, if filter paper becomes transparent it indicates presence of fatty acids.

***Coumarins***
To the 2 ml of extract, 3 ml of 10% NaOH was added; appearance of yellow colour indicates presence of coumarins.

***Emodins***
2 ml of ammonium hydroxide and 3 ml of benzene were added to the extract, a color change to red indicates presence of Emodins.

## RESULTS

Qualitative phytochemical investigations for bark, wood, leaf and pod were carried out and results about occurrence are reported in Table 1.

**Table 1**
***Phytochemical profiling of crude extracts* from various plant parts of***

| Compound | Bark | | | | | Wood | | | | | Leaf | | | | | Pod | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | M | E | C | A | W | M | E | C | A | W | M | E | C | A | W | M | E | C | A |
| Tanin | - | - | - | - | - | - | - | - | - | - | + | - | + | - | - | - | - | - | - | - |
| Alkaloids | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Saponins | - | - | - | - | - | + | - | - | - | - | + | + | + | + | + | + | + | - | - | - |
| Terpenoids | + | + | + | - | + | - | + | + | + | - | - | + | + | + | + | + | + | + | + | + |
| Cardiacglycosides | - | - | - | + | - | - | - | - | - | + | + | - | - | - | - | - | - | - | - | + |
| Steroid | - | + | + | + | + | - | + | + | + | - | + | + | + | + | + | + | + | + | + | + |
| Flavonoids | - | + | - | - | - | - | + | - | - | - | - | + | - | - | - | - | - | - | - | + |
| Triterpenoids | - | - | - | - | + | - | + | + | + | + | + | - | - | - | + | - | + | + | + | + |
| Glycosides | - | - | - | - | - | - | - | - | + | - | - | - | - | + | - | - | - | - | - | - |
| Reducing Sugars | - | - | - | + | - | - | - | - | + | - | - | - | + | + | - | - | - | - | + | - |
| Phlobatanine | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Anthraquinone | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Leucoanthocyanine | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Fatty Acids | + | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Coumarins | + | + | - | - | - | - | - | - | - | - | + | - | - | - | - | - | - | - | - | - |
| Emodins | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**** Extraction System: W=Water, M=Methanol, E=Ethanol, C=Chloroform, A=Acetone***

***Radermachera xylocarpa (Roxb.) K. Schum*.**

Qualitative analysis out rightly rejected any presence of Phlobatanine, Anthraquinone, Leucoanthocyanine and Emodins in entire extraction systems from all the plant parts. Uniform presence of alkaloids was reported for all solvents. Steroids, Terpenoids and Triterpenoids were also evident in all plant parts but not for all the solvent systems. Selective presence of Tanin, Saponins, Cardiacglycosides, Flavonoids, Glycosides, Reducing Sugars, Fatty Acids and Coumarins was noted in different plant parts. This combination of the phytochemicals creates possibility of justification of the claimed as well as prospective medicinal application.

## DISCUSSION

Indigenous system of Indian medicine has always supported the application of plants in variety of plant disease control, genus *Ficus* is one of them[10] as the plant with higher concentration of alkaloids to use as an effective antidote. Indian folk healers have primarily used Indian Snakeroot (*Rauwolfia serpentina*) as an antidote for the treatment of the bites from poisonous snakes and insects. Many clinical researchers endorsed this attribute to the high concentration of the alkaloids present in *Rauwolfia* [11],[12],[13]. Antidote value of the aerial parts of *Pouzolzia indica* are also reported and revealed that the ethanolic and aqueous extracts were found to possess most significant activity[7]. Phytochemical contents of Apocyanaceous plants embarked the same relation of alkaloid crowd and antidote application of leaves[14]. Undoubted presence of alkaloid and absence of tannin may also have significant relation. Stedman's Shorter Medical Dictionary asserted that in most cases of poisoning tannin is antidotal to all alkaloids [15],[16]. The alkaloids and tannins are antagonistic for each other hence they are not always found together in single drug plant[17]. Organ wise screening showed richness of leaves in phytochemical constitution over pod, wood and bark. In addition, presence of terpenoids, cardiac glycosides, flavonoids, triterpenoids, reducing sugars makes the bark valuable with respect to phytochemical assets. This kind of composition made *R. xylocarpa* medicinally important and hence commonly used as one of the important drug composition [18]. Radermachol, was isolated from roots of *R. xylocarpa* and reported to have anti-inflammatory activity [19]. Seeds of *R. xylocarpa* drug plant species used antivenom[20].

## CONCLUSIONS

The ethnobotanical claims need to be justified by supporting it with the specific reasons at biochemical level. The present attempt was successful in validating the use of extracts from *R. xylocarpa* as antivenom. Further quantitative and structural studies will definitely come up with the novel biomolecules possessing multifaceted applications.

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