RESEARCH ARTICLE JPAR 2019

Journal of Pharmaceutical Advanced Research

(An International Multidisciplinary Peer Review Open Access monthly Journal)

Available online at: www.jparonline.com

Phytochemical and Antimicrobial evaluations of some selected plants in family *Acanthaceae*

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Received: 11.02.2019 Revised: 17.02.2019 Accepted: 22.02.2019 Published: 28.02.2019

ABSTRACT: Background: *Acanthaceae* is a family of dicotyledonous flowering plants containing almost 250 genera and about 2500 species. Most are tropical herbs, shrubs, or twining vines; some are epiphytes. **Aim:** The aim of the present study is to investigate the phytochemical and antimicrobial properties of selected plants in the family *Acanthaceae*. **Methods:** The Ethanol extract of four members of family *Acanthaceae* were screened against seven bacterial strains by Disc diffusion method and against two fungal species by Agar well method. **Result:** Among these, ethanol extract of *Strobilanthes barbatus* Nees showed maximum antibacterial activity against *Salmonella typhi* and *Streptococcus haemolyticus*. No plant extract showed antifungal property against the selected two fungal species. Presence of secondary metabolites is also found in these plant extract in varied degrees. **Conclusion:** The present study can be taken as a foreground for further researches in which *Strobilanthes barbatus* Nees may prove to be a major therapy in curing some diseases that affect the mankind in many ways.

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Keywords: *Acantahaceae*, Antimicrobial, Phenolics, Flavonoids, Alkaloids.

INTRODUCTIONS:

Plants, as a source of medicinal compounds have continued to play a dominant role in the maintenance of human health since ancient times [1]. The World Health Organization estimates that plant extracts or their active constituents are used as folk medicine in traditional therapies of 80% of the world's population [2]. Over 50 % of all modern clinical drugs are of natural product origin [3,4]. The screening of plant extracts and plant products for antimicrobial activity has shown that higher plants represent a potential source of novel antibiotic prototypes [1]. Numerous studies have identified compounds within herbal plants that are effective antibiotics [5]. Traditional healing systems around the world that utilize herbal

remedies are an important source for the discovery of new antibiotics; some traditional remedies have already produced compounds that are effective against antibiotic-resistant strains of bacteria [6,7]. The results of this indicate the need for further research into traditional health system. It also facilitates pharmacological studies leading to synthesis of a more potent drug with reduced toxicity [8]. The need of the hour is to screen a number of medicinal plants for promising biological activity. The objective of the present study is to evaluate the phytochemical and antimicrobial analysis of selected members of *Acanthaceae*.

MATERIALS AND METHODS:

The ethanol was purchased from S.D. Fine Chemical, Mumbai. All other chemicals and reagents were of analytical grade and procured from authorized dealer.

Collection, identification and preservation of Voucher specimens:

The aerial portions with maximum leaves along with tender stems were collected from the members of the family *Acanthaceae* (*Andrographis artopurpurea* (Dennst.) Altson, *Strobilanthes barbatus* Nees, *Justicia adhatoda* L, *Justicia gendarussa* Burm. F.). Identification of plants was done by using available Floras and literature [3,6].

Preparation of Leaf extract:

About 20 g of fresh leaves of each plant weighed accurately and several such packets were stored in refrigerator. Leaves from one such packet is grinded to make the extract with 20 ml of 90 % ethanol making the final concentration to 1 g/ml. The extract was filtered to get a clear solution devoid of any debris. It was kept in clean conical flask, corked properly and stored in refrigerator.

Preliminary phytochemical analysis [7,8]:

***Preparation of TLC plates*:**

Clean and dried glass plates were placed on a flat plastic tray side by side with no gap between adjacent plates. The stationary phase (Silica gel slurry) is prepared and applied as a uniform layer of 0.25 mm thickness. It is spread by a moving spreader from one end to another end. The plates are activated at 105 °C for 30 min and allowed to cool before use. Solvent system of petroleum ether and acetone in the ratio 1:1 was used as a mobile phase. Alkaloids was identified by using Marguis reagent, in which reagent was applied on to TLC plates consists of 5 ml formaldehyde in 50 ml concentrated sulphuric acid. Yellow purple spots indicate the presence of alkaloids.

Phenolics compound was detected by using Folin-Ciocalteau reagent, in which the undiluted folin reagent was sprayed and its colour change was observed followed by exposure with ammonium vapor. If there phenolics compound shall be present then the spots become darker.

Flavonoids compounds were detected by using basic lead acetate solution, in which 25 % aqueous solution of basic lead acetate spots fluorescence in UV light.

Bacterial Strain:

The bacterial strains used were *Vibrio parahaemolyticus*, *Salmonella typhi*, *Bacillus cereus*, *Enterobacter sp.*, *Salmonella paratyphi*, *Escherichia coli*, *Streptococcus haemolyticus*. The fungal stains used were *Rhizopus* and *Aspergillus* species.

Antibacterial test (disc diffusion method):

The antimicrobial property of the samples was studied by using the paper disc method. Filter paper disc of 5 mm diameter was prepared using paper punch. The filter paper discs were sterilized by autoclave at 120 °C for 15 min. Each disc was impregnated with plant extracts. The discs were used after drying them in an oven at 37 °C [8,9].

Antifungal well method:

Well method was used for conducting the antifungal analysis. In this case, wells were made in petriplates containing 6 days old fungal cultures and into this wells plant extracts were loaded using a micropipette [8,9].

RESULT AND DISCUSSION:

The antimicrobial activity of ethanol extracts of four selected plants in *Acanthaceae* family showed variations. The results are reported in Table 1. Phytochemical analysis of these plants also showed variations. From the data it is clear that ethanol extract of *Strobilanthes barbatus* showed maximum inhibition against two bacterial strains namely *Salmonella typhi* and *Streptococcus haemolyticus* (Fig 2 and 7). *Vibrio parahaemolyticus*, *Bacillus cereus*, *Enterobacter Sp.*, *Salmonella typhi* and *E. coli* were resistant to the selected plants and showed no inhibition zone as evident from Fig 1,3,4,5 and 6. The selected plants do not shows antifungal property against the selected fungal species as represented in Fig 8 and 9. The phytochemical analysis of selected plants was conducted in order to detect the presence of various secondary metabolites.

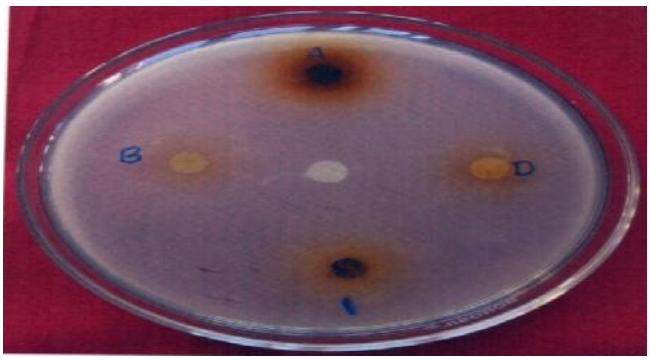


Fig 1. Screening against *Vibrio parahaemolyticus.*

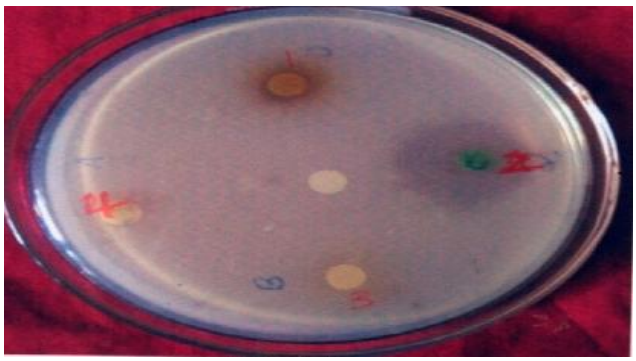


Fig 2. Screening against *Salmonella typhi.*

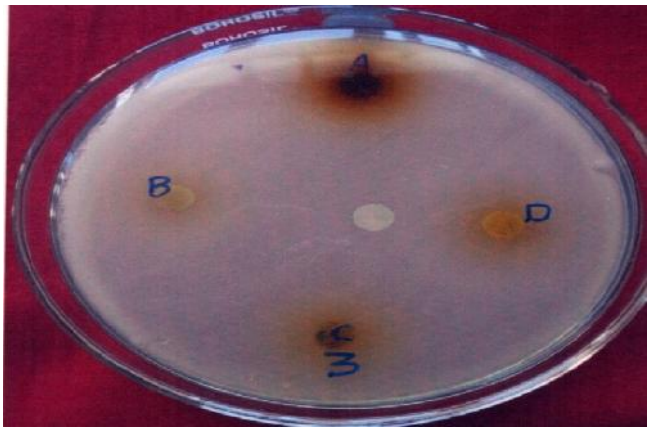


Fig 3. Screening against *Bacillus cereus*.

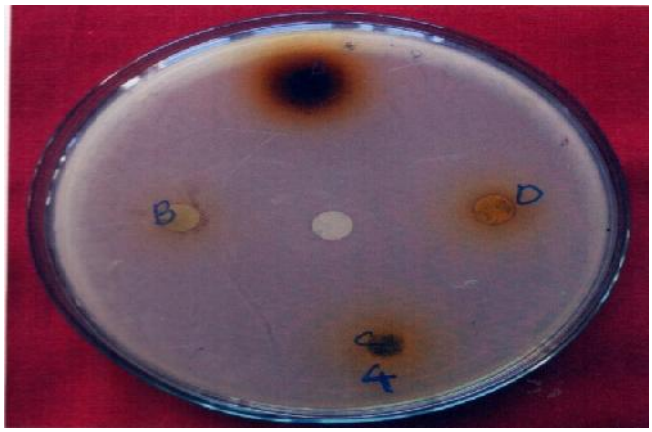


Fig 4. Screening against *Enterobacter sp.*

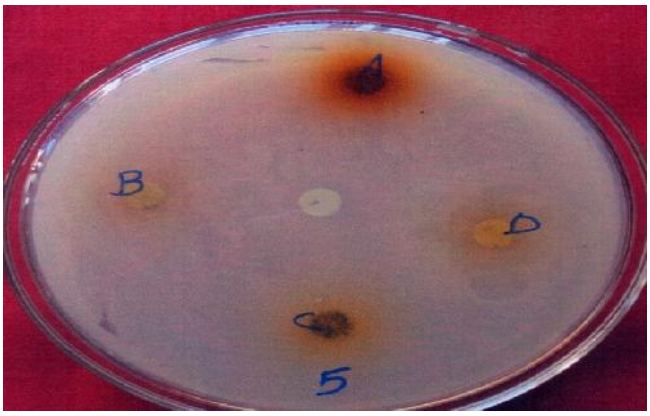


Fig 5. Screening against *Salmonella typhi.*

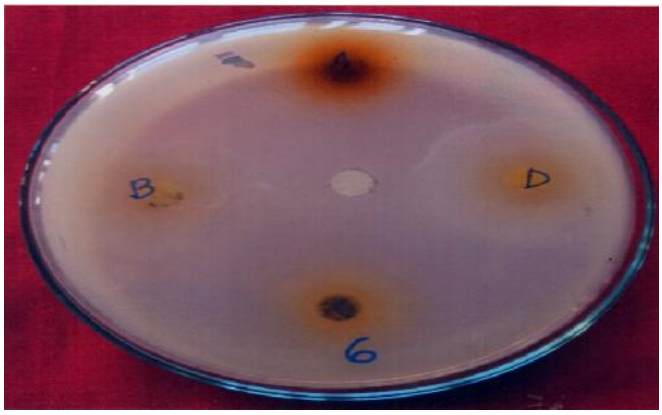


Fig 6. Screening against *E coli.*

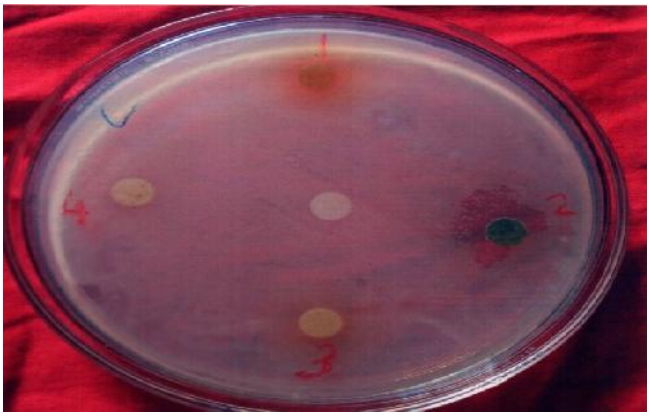


Fig 7. Screening against *Streptococcus haemolyticus*.

Fig 8. Screening against *Aspergillus sp.*

Table 1. Antibacterial effects of ethanol extract of selected plants in *Acanthaceae* family.

Bacterial Strain	Zone of inhibition (Diameter in mm)			
	AA	SB	JG	JA
VP	--	--	--	--
ST	--	15±1	--	--
BC	--	--	--	--
ES	--	--	--	--
SP	--	--	--	--
EC	--	--	--	--
SH	--	9±0.5	--	--

Data are presented as mean ± standard deviation (n = 3). AA – *Andrographis artopurpureae*, SB - *Strobilanthes barbatus*, JG - *Justicia gendarussa*, JA - *Justicia adhatoda*. VP - *Vibrio parahaemolyticus*, ST - *Salmonella typhi*, BC - *Bacillus cereus*, ES - *Enterobacter sp.*, SP - *Salmonella paratyphi*, EC - *Escheretia coli* and *Streptococcus haemolyticus*.

Table 2. Phytochemical screening of ethanolic extract of leaves of plants of family *Acanthaceae*.

Plant Name	Phytochemicals		
	Alkaloids	Phenolics	Flavanoids
Andrographis artopurpureae	-	+	+
Strobilathes barbatus	+	+	+
Justicia adhatoda	-	+	+
Justicia gendarussa	+	-	+

+ and – sign represents present and absent.

Presence of Alkaloid was found in *Strobilanthes barbatus* and to some extend in *Justicia gendarussa* also. Presence of flavanoid was observed in one plant *Justicia gendarussa* while the presence of phenol was observed in *Justicia adhatoda* as given in Table 2 and Fig 10. Similar studies were conducted in some species of *Acanthacea* namely *Adathoda beddomie*, *Justeceae gendurussa*, *Neelagirianthasis hemitomie*, *Berleria priorities*, *Adathoda zeylanica* and *Hemigraphis corolat*. *Studies* on these seven plants indicated that tannins were present in them and it was responsible for the antimicrobial and phytochemical analysis on these selected plants.

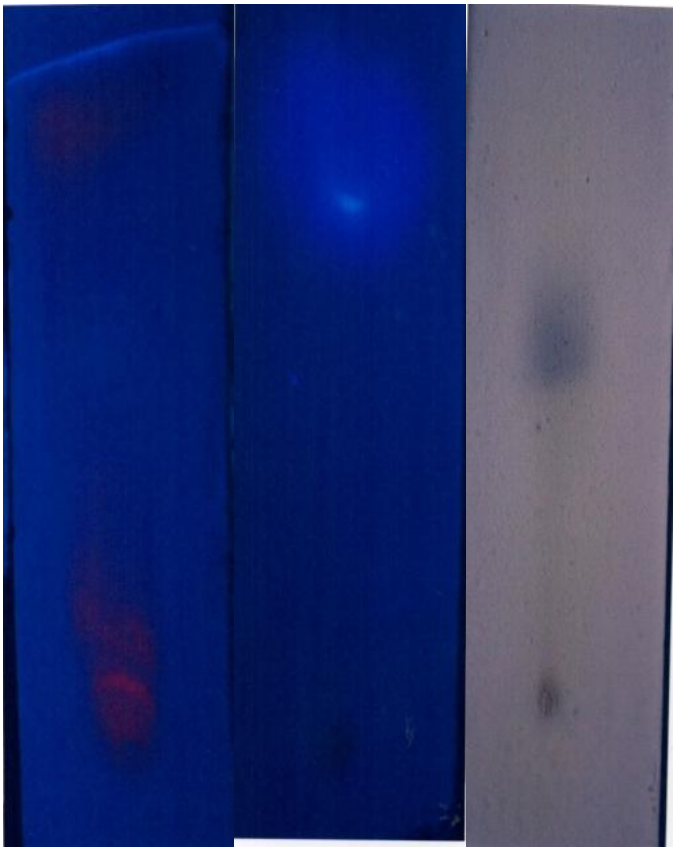
CONCLUSION:

It could be concluded that the species *Strobilanthes barbatus* of family *Acanthaceae* possessed significant antibacterial activity against the microbes *Salmonella typhi* and *Streptococcus haemolyticus*. Further study has to be done to identify the active moiety responsible for antibacterial activity.

ACKNOWLEDGEMENT:

Authors are thankful to authority of Dept. of Botany, St. Joseph's College (Autonomous) Devagiri, Kozhikode, Kerala, India for giving facility to carry out this research work.

Fig 9. Screening against *Rhizopus sp.*



(A) (B) (C)

Fig 10. Presence of alkaloid in *Justicia gendarussa* (A), Flavonoids *Strobilanthes barbatus* (B) and phenolics in *Justicia adhatoda* (C).

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Conflict of Interest: None
Source of Funding: Nil
Paper Citation: Neena A, Mahesh Mohanan P, Thomas B. Phytochemical and Antimicrobial evaluations of some selected plants in family *Acanthaceae*. J Pharm Adv Res, 2019; 2(2): 479-483.