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Evaluation of phytochemical screening and antibacterial activity of traditional medicinal plant *Euphorbia hirta* Linn. (Euphorbiaceae)

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Abstract
The medicinal plants represents an enormous reservoir of potential microbial compounds that could be useful as an alternative to synthetic microbicides and are being used to develop drugs. They are the most common source of antimicrobial agents are the part and parcel of human society to compete diseases from the dawn of civilization as they have minimum side effects. The present study deals with the Phytochemistry and Antimicrobial activity of *Euphorbia hirta* L. belongs to the family Euphorbiaceae. It was found that Methanol extract possess good zone of inhibition whereas water showed activity only on higher concentration. The inhibitory activity may be pathogen specific or due to the phytochemical properties of respective plant species and the solvents used for the extraction of secondary metabolites.

Keywords: Medicinal plants, *Euphorbia hirta*, Antibacterial activity

1. Introduction
Medicinal plants are the local heritage with global importance. World is endowed with a rich wealth of medicinal plants. Herbs are always been the principal form of medicines in India and presently they are becoming popular throughout the developed worlds, as people strive to stay health in the face of chronic stress and pollution. Medicinal plants have been used since ancient times for the treatment of human ailments. It's reported that more than 150 pure chemical compounds, derived from higher plants, find their place in modern medicine [1]. It's clear that the plant kingdom harbors' an inexhaustible sources of active ingredients invaluable in the management of many intractable diseases.
Herbal medicines have been practiced worldwide and is now recognized by World Health Organization (WHO) has an essential building block for primary health care [2]. Ayurvedic system of medicine is prevalent in India since the Vedic period and as an early as the dawn of human civilization [3]. Medicinal plants have bioactive compounds which are used for curing of various human diseases and also play an important role in healing because of the presence of phytochemical constituents [4]. Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense and protect from various diseases [5]. Phytochemistry has undergone significant development in recent years as a distinct discipline [6].
Medicinal plants being the most common source of antimicrobial agents are the part and parcel of human society to compete diseases from the dawn of civilization as they have minimum side effects [7]. The present study deals with the Phytochemistry and Antibacterial activity of *E.hirta* L. belongs to the family Euphorbiaceae. It's a medicinal rhizomatous herb, which is a small, erect or ascending reaching up to 50 cm, with hairy stems (Fig 1). The extract of the plant is used in the treatment of asthma, cough, chronic bronchitis and other pulmonary diseases [8]. Thus this study aims at determining the antibacterial effects of the Euphorbiaceae plant.

Fig 1

2. Materials and Methods
Plant material
Fresh plant samples were collected from Coimbatore district of Tamilnadu, during December 2014.The plants were brought in to the laboratory after proper identification. Fresh plant material were washed under running tap water, air dried and then homogenized to fine powder and stored in airtight bags.

Phytochemical screening test
Phytochemical screening is done for analyzing primary and secondary metabolites, which are responsible for curing ailments. The plant powder was subjected to methanol and water. 54.2gm of plant was extracted using soxhlet apparatus and this was used for further analysis (Table1). The phytochemical screening of the plant extract was carried out by the following method by Harbone (1973) and Koktae, *et al*., (1995).

Test organism used

The test microorganism like *Escherichia coli*, *Klebsiella pnueminiae*, *Pseudomonas aeruginosa*, *Proteus vulgaris* were used. The microorganisms were collected from The Department of Microbiology, Nehru College, Coimbatore.

Antibacterial Assay

Plant extract of *E.hirta* which was prepared with different solvents like Methanol and Water were used to text their antibacterial activity.

Antibacterial activity of the plant extracts tested with the disc diffusion method according to Bauer, *et al*., (1996). Liquid nutrient agar media and petriplates were sterilized by autoclaving at 120°C for 20min.Under aseptic conditions in the laminar air flow chamber about 20ml of the agar medium was dispensed in to each petriplates to yield a uniform depth of 4mm. After the solidification of the media the bacterial strains were swabbed on the surface of the agar plates. Whatmann No.1 filter paper was cut in to small disc of 6mm diameter and autoclaved. These disc were dipped in to the different plant extracts of each five concentrations namely (25mg/ml, 50mg/ml, 75mg/ml, 100mg/ml). The dipped discs were placed on the appropriate swabbed petriplates such that each petriplates have five concentrations of each plant extracts. It was then incubated at 37°C for 24 hours, after incubation the size of the inhibition zone were measured in millimetres (Table 2 and 3, Fig 2).

3. Result and Discussion

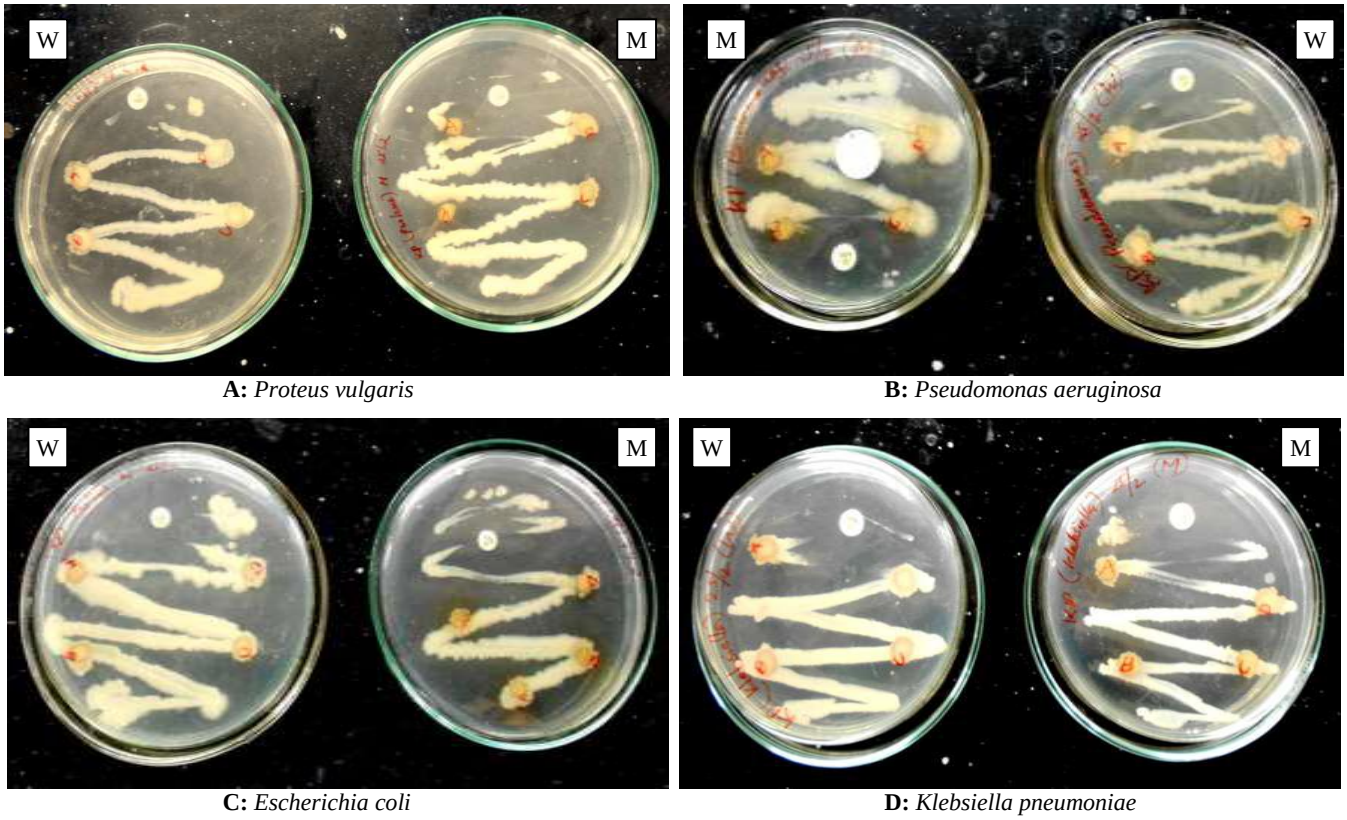
Methanolic extract of *E. hirta* showed the presence of alkaloids, carbohydrates, cardiac glycosides, flavanoids, proteins and amino acids, tannins and phenolic compounds, steroids and sterols and terpenoids. But resins and saponins are completely absent. Where as in Water extract only alkaloids, carbohydrate, tannins and phenolic compounds were present. Cardiac glycoside, sterols and steroids and tannins were present only in lesser amount. Saponins and resins were completely absent in both the extracts (Table- 1).

Antibacterial activity of *E. hirta* is given in the table 2 and 3. Methanolic extract of *E. hirta* shows high activity against the pathogens (Fig 2). In this 100mg/ml of Methanol extract given maximum activity against the 4 bacteria (Table 3). In this concentration highest activity is shown against *Proteus* (14mm) and *Klebsiella* (14mm) and least activity was given by 25mg/ml of the extract in which *Proteus* (6mm), *Pseudomonas* (6mm) and *E.coli* (6mm) showed the activity. In distilled water extract, showed less activity against all the 4 bacteria except in 100mg/ml (Table 2). In this concentration, *Pseudomonas* (10mm), *E.coli* (8mm) and *Klebsiella* (8mm) showed the activity. (Fig 1).

Table 1: Phytochemical Screening of *E. hirta*

S. No	Types of compounds	Crude extract of *E.hirta*	
		Methanol	Water
1.	Alkaloids	+++	+++
2.	Carbohydrate	+++	++
3.	Saponins	-	-
4.	Cardiac glycosides	+++	+
5.	Flavanoids	+++	+
6.	Proteins and Amino acids	+++	+
7.	Tannins and Phenolic compounds	++	++
8.	Sterols and Steroids	+++	+
9.	Fixed oils and fats	+	+
10.	Terpenoids	+++	++
11.	Resins	-	-

+++ : More amount, ++ : Marginal amount, + : Minimum amount, - : Absent



A: *Proteus vulgaris* **B:** *Pseudomonas aeruginosa*

C: *Escherichia coli* **D:** *Klebsiella pneumoniae*

Fig 2: Antibacterial activity of water and methanolic extract of *E.hirta*;

Table 2: Antibacterial activity of Methanol extract of *E.hirta*

S. No	Name of the bacterial species	Zone of inhibition in mm				
		C(Gentamycin	25%mg/ml	50%mg/ml	75%mg/ml	100%mg/ml
1.	*Escherichia coli*	14	6	10	10	12
2.	*Pseudomonas aeruginosa*	15	6	8	12	12
3.	*Proteus vulgaris*	18	6	9	10	14
4.	*Klebsiella pneumoniae*	16	-	-	-	14

Table 3: Antibacterial activity of Water extract of *E.hirta*

S. No	Name of the bacterial species	Zone of Inhibition				
		C(Gentamycin	25%mg/ml	50%mg/ml	75%mg/ml	100%mg/ml
1.	*Escherichia coli*	12	-	-	-	8
2.	*Pseudomonas aeruginosa*	12	-	-	-	10
3.	*Proteus vulgaris*	8	-	-	-	-
4.	*Klebsiella pneumoniae*	13	-	-	-	8

4. Summary

Scientists have realized an immense potential in natural products from medicinal plants to serve as alternate source of combating infections in human beings which may be of lower cost and lesser toxicity. Further investigations are required in order to isolate more new compounds from the plant extracts and to test their bioactivities with the aim of increasing the drug arsenal currently used in the treatment and prophylaxis of human and animal diseases.

The present study revealed that the antimicrobial activity of *E. hirta* showed significant activity against some tested bacterial strains. The inhibitory activity may be pathogen specific or due to phytochemical constituents of respective plant species and the solvents used for the extraction of secondary metabolites. However, before coming to the conclusive statement, further research is needed to investigate the antibacterial ingredients.

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