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Phytochemical Screening and the Antimicrobial Properties of *Acalypha hispida* Burm. F. (Euphorbiaceae).

Osarumwense PO[1] and Okunrobo LO[2]*.

Departments of [1]Chemistry, Faculty of Physical Sciences, [2]Pharmaceutical Chemistry, Faculty of Pharmacy, University of Benin, Benin City, Nigeria.

ABSTRACT

Alcalypha hispida was screened for its phytochemical composition and evaluated for the antimicrobial activities. The phytochemical analysis indicated the presence of reducing sugar, saponins, cardiac glycosides, tannins, flavonoids, alkaloids, carbonyl group, terpenoids, and Phlobatanins. The extract had significant activity against Gram positive micro-organism, *Staphylococcus aureus, Bacillus subtilis, Gram negative, Escherichia coli, Pseudomonas auroginosa, fungi Candida albicans and Aspergillus flavis. The medicinal uses of this plant are supported by the presence of the above mentioned constituents and the antimicrobial activities. Hence, the need to explore the potential of this plant especially in area of traditional medicine and pharmaceutical industries arises.*

KEYWORDS: *Acalypha hispida,* Phytochemical screening, Antimicrobial activity,

INTRODUCTION

The study of plants is one of the oldest activities of man essentially as sources of food and medicine for our well being. We cannot ignore plant because over 70%/o of our populace use them and live in rural setting where orthodox drugs are not readily available [1].

Acalypha hispida, the Chenille plant is a flowering shrub which belongs to the family Euphobiaceae, the subfamily *Acalyphinae,* and the genus *Acalypha* is the fourth largest genus of the Euphorbiaceaes family, and contains many plants native to Hawaii Oceania. This plant is known as the Philippines Medusa, red hot cat's tail and fox tail in England, *pokok ekor kucing* in Malaysia*, Robo de Gato* in Portuguess and *Tai tuong duoi chon* in Vietnamese. *Acalypha hispida* is cultivated as a house plant because of its attractiveness and brilliantly coloured furry flower [2].

Euphorbiaceae comprises of 280 genera and 730 species with the largest genus Euphorbia having about 1600 species. Generally, they have a characteristic milky latex [3], sticky sap, co-carcinogenic, severe skin irritation and toxic to livestock and humans [4].

The plant originated in Oceania but has become naturalized to multiple countries in North America, including the United States, Mexico, and Brazil. It can grow to be six to twelve feet (1.8-3.7meters) tall, and have a spread of three to six feet 90.9-1.8meters). The plant become somewhat domesticated, due to the nature and colour of its flowers. It can be grown from seeds as well as from cutting. It can be kept either as an outdoor plant or as a houseplant. However, care should be taken in growing it, as all parts of the plant are poisonous if ingested by animals [5].

This plant is believed by traditional healers to possess medicinal properties that are effective in management of tuberculosis and other ailments. The aim of this study was to analyses the leaf extract for the phytochemical composition and to test for its antimicrobial activities.

MATERIALS AND METHODS

Plant materials

Fresh leaves samples of *Acalypha hispida* were collected from Uselu market in Benin City, Edo State, Nigeria. It was identified at the Botany

*Author for correspondence; *E-mail address:* okunrobo@uniben.edu,; Tel: + 234-8034725416

Department, Faculty of Life Science, University of Benin, Benin City where a voucher number 1858 is deposited. The leaves were initially rinsed with distilled water, air dried in the laboratory under shade and ground into powder.

Preparation of plant extract

The powdered mass of 1000g of *Acalypha hispida* was extracted by Soxhlet apparatus (Quickfit, England) using methanol (2.0 L). The extract was filtered through filter paper and filtrate was concentrated under reduced pressure in a rotary vacuum evaporator. Phytochemical tests were carried out on the extract.

Phytochemical screening.

Qualitative assay, for the presence of plant secondary metabolites such as reducing sugar, saponnins, cardiac glycosides, tannins, flavonoids, Athraquinones, Phlobatanins, Cyanogenetic glycosides, Carbonyl group, terpenoids and alkaloids were carried out on the extract of the *Acalypa hispida* following standard procedure [6,7].

Antimicrobial analysis

Agar wall diffusion method was utilized for the antimicrobial activities [8]. Six species: *Staphylococcus aureus, Streptococcus aureus, Escherichia coli, Pseudomonas aeriginosa, Baccillus subtilis, Candida albicans and Aspergillus flaviis* stock cultures were used. The test organisms were supplied by the Pharmaceutical Microbiology Department of the University of Benin, Benin city. The test organisms were cultured overnight in nutrient broth, diluted to the turbidity of Marcfalon standard. 0.2ml of the broth culture is seeded on nutrient agar and is allowed to dry. The various concentrations of the extract were introduced. The culture plates are then incubated at 37^0 C for 24 hours and the result was taken by considering the zones of inhibition by the test extract [9]. Activity and inactivity were observed in accordance with the standard and accepted method.

RESULTS AND DISCUSSION

The phytochemical screening of *Acalypha hispida* revealed the presence of reducing sugars, saponnins, cardiac glycosides, tannins and flavonoids, Phlobatanins, Carbonyl group, terpenoids and alkaloids. The presence of these constitute gives an indication of the medicinal value of *Acalypha hispida* for example, flavonoids have been found to have antioxidant properties, antibacterial and antimicrobial properties [10].

TABLE 1: Phytochemical Screening of the methanol extract of *Acalypha hispida*.

Secondary metabolites	Extract
Reducing sugarss	+
Saponins	+
Anthracene glycosides	-
Deoxysugar cardiac glycosides	+
Tannins	+
Flavonoids	+
Alkaloids	+
Athraquinone	-
Carbonyl group	+
Terpenoids	+
Phlanbatanins	+
Cyanogenetic glycosides	+

Key: (+) present (-) absent

Table 2: Antimicrobial test of methanol extract of *Acalypha hispida* Zone of inhibition (mm).

	CONCENTRATIONS				
Micro-organism	**7.5mg/ 0.5ml**	**25mg/ 0.5ml**	**50mg/ 0.5ml**	**100mg/ 0.5ml**	**200mg/ 0.5ml**
Gram positive					
Staphylococcus aureus	17	20	25	27	30
Bacillus subtilis	14	16	17	18	22
Gram Negative					
Escherichia coli	-	-	-	12	14
Pseudomonas aeruginosa	12	14	16	22	33
Fungi					
Candida albicans	-	-	-	-	12
Aspergillus flaviis	18	22	25	29	35

Table 3: Positive control

	ZONE OF INHIBITION(mm)		
	Augmentin	Ampicillin	Fluconazole
Escherichia Coli.	29	18	-
Pseudomonas auroginosa	13		
Staphylococcus aureus.	50	23	
Candida albican		22	8
Aspergillus flaviis			29

According to Ibeh and Uraih [11], an inhibition zone diameter of 10 mm or less indicates that the organism is resistant. The value of 11-15 mm showed intermediate effect and 16 mm and above indicate that the organism is susceptible to the compound, that is, the extract has an antimicrobial activity. The current study showed a value of 16 mm which may be related to susceptibility of organism to the tested extract. The extract shows higher activity against *Staphylococcus aureus* for Gram positive micro-organism and a higher activity against *Escherichia coli* for the Gram negative micro-organism.

The extract shows a higher activity against *Staphylococcus aureus* for the Gram positive micro-organism and higher activity against *Pseudomonas aeuroginosa* for the Gram negative micro-organism. For the fungi it shows a higher activity against *Aspergillus flaviis*.

Comparing the activity with some standard drugs, the extract has a higher activity against *Staphylococcus aureus* than Ampicillin with zone of inhibitions 30 mm and 27 mm at 200 mg/0.5ml and 100 mg/0.5ml concentrations respectively. For *Pseudomonas auroginosa*, it has a higher activity than Augmentin and Ampicillin with zone of inhibitions of 33 mm and 22 mm at 200 mg/0.5ml and 100 mg/0.5ml concentrations. The extract shows a higher activity against Candida albicans than Fluconazole with zone of inhibition 12 mm at 200 mg/0.5ml concentration.

The medicinal flora in the tropical eco-region has a preponderance of plants that provide raw material for addressing a range of medicinal disorders and pharmaceutical requirements. Collectively plants produce a remarkable diverse array of over 500,000 low molecular mass natural products also known as secondary metabolites [12].

The medicinal value of these secondary metabolites is due to the presence of chemical substances that produce a definite physiological action on human body. The most important of these include: alkaloids, glycosides, steroids, flavonoids, fatty oils, resins, mucilages, tannins, gums, phosphorus and calcium for cell growth, replacement, and body building [13].

The medicinal uses of this plant are supported by the presence of the above mentioned constituents and the antimicrobial activities. Hence, the need to exploit the potentials of this plant especially in areas of traditional medicine and pharmaceutical industries arises.

Studies have shown that some of the *Euphorbia* species are used as purgative [14]. They are also used in the treatment of cough, asthma and fever [15]. However, studies have indicated that certain bioflavonoids have inhibitory activity against human pathogen bacterial [16]. Therefore, the presences of these metabolites in Acalypha hispida tend to support its medicinal uses.

CONCLUSION

In conclusion, the plant studied here can be seen as a potential source of useful drugs. Also, this work revealed that this extract has activity against Gram positive, Gram negative micro-organism and fungi in a dose-dependent manner. However, further studies can be done on this plant in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds.

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