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ANTIFUNGAL ACTIVITY OF *ACALYPHA WILKESIANA* LEAVES AGAINST SOME COMMON FUNGI

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ABSTRACT

Herbal medicine represents one of the most important fields of traditional medicine all over the world. To promote the proper use of herbal medicine and to determine their potential as sources for new drugs, it is essential to study medicinal plants, which have folklore reputation in a more intensified way.This study was carried out to evaluate potentials of *Acalypha wilkesiana* against common fungus *Trichophyton mentagrophytes*, *Aspergillus niger* and *Candida albicans*. The agar diffusion method was used to screen for antifungal activity. Ditches wells of 5mm diameter were cut on the seeded plates using sterile Cork borer. Each well was filled with 0.1ml of 10, 20 and 30mg/ml of the extracts of *Acalypha wilkesiana*. The plates were incubated at 27^0C for 7days and zone of inhibition was plotted. Out of three fungal species, the extract showed dose dependent antifungal activity against *Aspergillus niger* and *Candida albicans*, while no activity was recorded against *Trichophyton mentagrophytes*. In all the cases maximum zone of inhibition was recorded in positive control set of experiment, *Aspergillus niger*, was cecorded more suceptible to extract. Conclusively it can be said that this plant can be used to cure the diseases caused by *Aspergillus niger* and *Candida albican*.

KEYWORDS: *Acalypha wilkesiana, Trichophyton mentagrophytes,* Tinea capitis, antifungal activity, ringworm infection etc.

INTRODUCTION

Medicinal plants contain numerous biologically active compounds which have medicinal activities (Canini *et al.*, 2007). Medicinal plants are the richest bio-resources of drugs of traditional system of medicine, modern medicine and chemical entities for synthetic drugs; whose values lie in some chemical substances that produce a definite physiological action on the human body (Neube and Umar, 2001).

The demand on plant based therapeutics is increasing in both developing and developed countries due to growing recognition that they are natural products, nonnarcotic, easily biodegradable producing minimum environmental hazards, having no adverse side effects and easily available at affordable prices.

Plant-based bioactive compounds have enormous therapeutic potential as they can serve the purpose with lesser side effects that are often associated with synthetic drugs (Adegboye *et al*., (2008). It is now well known that medicinal plants have varieties of chemicals that not only treat illness but, they boost immune system of the person (Singh *et al*., 2017). A continuous and persistent dependency on medicinal plants can boost not only their immune system but improve, over all health in general as well as being rich in antioxidants they detox the body too (Singh *et al*., 2017).

In developing and under developed countries the high cost of the drugs is also becoming a major problem with regard to the economic status of their people. The dermatophytes causing ringworm are common and contagious and the fungus develops resistance against drugs very rapidly, this makes therapy and prevention difficult. Herbal drugs are now becoming drugs of choice in many countries in the world and they are found to have lesser cases of drug resistance records. Therefore in the present study we have evaluated the antifungal activity of the leaves of *Acalypha wilkesiana* against fungi *Trichophyton mentagrophytes, Aspergillus niger* and *Candida albicans* in laboratory conditions.

MATERIALS AND METHODS

Collection and Identification of Plant Samples

The leaves of *Acalypha wilkesiana* were handpicked from compound of the Old Faculty of Law of Usmanu Danfodiyo University Sokoto, and identification and authentication of the plant was carried out in the Botany Laboratory of the Department of Biological Sciences, Faculty of Science, Usmanu Danfodiyo University, Nigeria. The leaves were washed, air-dried and grounded

into fine powder using mortar and pestle in the laboratory as described by Mukhtar and Tukur (1999).

Extraction of the Plant

To prepare aqueous extract hundred grams (100 g) of the powdered plant leaves was dispensed in 800ml of distilled water, kept for 24 hours with shaking at regular intervals after which the content was filtered and the filtrate was used (Fatope *et al*., 1993).

Preparation of Culture Media

Potato Dextrose Agar (PDA) was used in this study as the medium suitable for growth of fungi. The potato agar was prepared according to manufacturer`s instructions. Thirty nine grams of the potato dextrose agar powder was homogenized in 1000ml of distilled water. It was then heated on a hot plate to dissolve completely, then poured into 100ml conical flasks and plugged by cotton wool plug to seal the mouth of each conical flask containing the media. The media was then autoclaved at 121^0c for 15minutes. After the sterilization the media was allowed to cool to 45^0c. Different concentration of the extracts were dissolved in each test tube. The extract was incorporated with media prepared before dispensing (Arekemase *et al.,* 2012).

Isolation and Collection of the Test Organisms

The organisms used for this study were *Trichophyton mentagrophytes*, *Aspergillus niger* and *Candida albicans*. The *Trichophyton mentagrophytes* was isolated from head of Yaro boys moving around the campus of Usmanu Danfodiyo University Sokoto, using a dissecting needle and inoculated on the surface of agar with a small portion of an actively growing colony. Care was taken not to transfer agar from the culture plate because nutrients in the agar may give false-positive results. Incubation was done at 30°C for 7 days (Mahmoud *et al*., 2009). The two other fungi (*Aspergillus niger* and *Candida albicans*) were collected from Mycology Laboratory Usmanu Danfodiyo University, Sokoto.

Determination of the Antifungal Activities of the Extracts

The agar diffusion method was used to screen for antifungal activity. Ditches wells of 5mm diameter were cut on the seeded plates using sterile Cork borer. Each well was filled with 0.1ml of 10, 20 and 30mg/ml of the aqueous extracts of *Acalypha wilkesiana*. The same was repeated four times for each fungus. The plates were incubated at 27^0C for 7days. The growth was observed and zone of inhibition was measured (Arekemase *et al.,* 2012). Control experiments were carried out using 10mg/ml of Fluconazole for positive control and 0.1ml of distilled water for negative control.

The data generated was analyzed for the three different concentrations (10, 20 and 30mg/ml) that produced zone of inhibition by ANOVA.

RESULTS

Diameters of Zone of Inhibition on *Trichophyton mentagrophytes* Result of antifungal activity on *Trichophyton mentagrophytes* had shown no activity at all the three concentrations (mg/ml) of the aqueous extract of *Acalypha wilkesiana* leaves (Table 1).

Diameters of Zone of Inhibition on *Aspergillus niger*

The result of antifungal activity of the extract on *Aspergillus niger* had shown different levels of activity at different concentrations. The highest zone of inhibition was recorded at concentration of 30 mg/ml which had 31.6 mm and the least zone of inhibition was recorded at the concentration of 10 mg/ml which had 12.8mm, while the positive control (Fluconazole 10 mg/ml) showed the maximum zome of inhibition of 36.6 mm (Table 2).

Diameters of Zone of Inhibition on *Candida albicans*

Against the fungus *Candida albicans*, the highest zone of inhibition was recorded at concentration of 30 mg/ml which had 24.7 mm, followed by 20mg/ml which showed 16.9 mm and the least zone of inhibition was recorded at the concentration of 10 mg/ml which had 9.6 mm, while the positive control (Fluconazole 10 mg/ml) showed the maximum zome of inhibition of 32.6 mm (Table 3).

Table 1: Diameters of Zone of Inhibition on *Trichophyton mentagrophytes* at Different Concentrations (mg/ml) of the *Acalypha wilkesiana* Aqueous Extract.

Test Organism	Aqueous extract (mg/ml)	Mean Diameter of Zone of Inhibition (mm)
Trichophyton mentagrophytes	10	-
	20	
	30	
Positive Control	Fluconazole (10mg/ml)	38.6
Negative Control	Distilled Water 0.1 ml	-

Table 2: Diameters of Zone of Inhibition on *Aspergillus niger* at Different Concentrations (mg/ml) of the *Acalypha wilkesiana* Aqueous Extract.

Test Organism	Aqueous extract (mg/ml)	Mean Diameter of Zone of Inhibition (mm)
Aspergillus niger	10	12.8
	20	22.1
	30	31.6
Positive Control	Fluconazole (10mg/ml)	36.6
Negative Control	Distilled Water 0.1 ml	-

Table 3: Diameters of Zone of Inhibition on *Candida albicans* at Different Concentrations (mg/ml) of the *Acalypha wilkesiana* Aqueous Extract.

Test Organism	Aqueous extract (mg/ml)	Mean Diameter of Zone of Inhibition (mm)
Candida albicans	10	09.6
	20	16.9
	30	24.7
Positive Control	Fluconazole (10mg/ml)	32.6

DISCUSSION

The present study had revealed that *Acalypha wilkesiana* leaves extract has no antifungal activity against *Trichophyton mentagrophytes* which is one of the fungal species that cause Tinea capitis but it had shown a dose dependent activity against *Aspergillus niger* and *Candida albicans.*

From the results it is clear that, the leave extract of *Acalypha wilkesiana* against *Trichophyton mentagrophytes* has no antifungal effect. This may be as a results of the fact that resistance to antimicrobial agents cannot be eliminated but curtailed, since some organisms are intrinsically resistant as stated by Oluremi *et al.* (2010). And this result is in agreement with the findings of Onocha and Olusanya (2010) and Muyideen *et al.* (2013) who worked on methanolic extracts of *A. wilkesiana* against *Aspergillus niger* and *Candida albicans* and antibacterial and antifungal activity of *Acalypha wilkesiana* respectively. The results of this study has also shown that plant extract have effect against *A. niger* which support the findings of Oladunmoye (2006) that worked on the comparative evaluation of antimicrobial activities and phytochemical screening of two varieties of *A. wilkesiana*.

Antifungal activity of the leave extract of *Acalypha wilkesiana* against *Aspergillus niger* and *Candida albicans* had shown visible effect (Table 2 and 3) and this indicated presence of antifungal moieties in it. The study also agreed with the findings of Muyideen *et al.* (2013) who worked on antibacterial and antifungal activity of *Acalypha wilkesiana.* The antifungal activity seen in *A. niger* and *C. albicans* might be due to their antioxidant, antitrypanosomal, antibacterial and antifungal activities (Shirwaikar *et al.*, 2004; Perez and Vargas, 2006; Marwah *et al.*, 2007).

Acalypha wilkesiana leaves extract was found to exhibit antifungal activity at concentrations ranged from 10 to 30 mg/ml for *Aspergillus niger* and *Candida albicans* (Table 2 and 3) with maximum effect at 30mg/ml which is in agreement with Arekemase *et al.* (2012) and Adegboye *et al.* (2008) who reported 10, 20 and 30mg/ml as an effective concentration for antimicrobial effect. Both *Aspergillus niger* and *Candida albicans* show susceptibility to the extract with 30mg/ml as 31.6 and 24.7mm respectively being the most effective and this is in agreement with Arekemase *et al.* (2012). Statistical analysis showed significant difference ($p \leq 0.05$) between the concentrations 10, 20 and 30mg/ml used in testing the antifungal activity of the aqueous extract of *Acalypha wilkesiana* against *Aspergillus niger* and *Candida albicans* where P=0.001.

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