

## EFFICACY OF COMMONLY USED CREAMS AGAINST FUNGI CAUSING SKIN DISEASE IN SOKOTO METROPOLIS

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### ABSTRACT

Study on the efficacy of four (4) selected creams was carried out using Agar well method. Samples were collected from the slanted bottles, preserved in mycology lab of Biological Sciences Department, Usmanu Danfodiyo University. Antifungal susceptibility test were applied to selected fungal isolates, the antifungal which consisted of Endix G, Clotrimazole, Ketoconazole and Funbact A. were evaluated against *T. rubrum*, *T. mentagrophyte*, *M. audouinii*, *M. gypseum*, *A. niger*, *A. flavus*, and *A. fumigatus* and the pathogens *M. audouinii* and *T. rubrum* were highly susceptible against Clotrimazole and funbact A respectively. Isolate of *M. gypseum* was less susceptible to funbact A, and *T. mentagrophyte* show resistance to all tested antifungal. The studies recommend the susceptibility of the Endix G, Clotrimazole, and Funbact A, for the treatment of *T. rubrum*, *M. audouinii* and *M. gypseum* dermatophytoses.

**Keywords:** Dermatophytoses, Endix G, Clotrimazole, Funbact A and Ketoconazole.

### INTRODUCTION

Skin, hair, nail, and subcutaneous tissues in human and animal are subjected to infection by several organisms, mainly fungi named Dermatophytes and cause dermatophytoses [1,2]. Dermatophytoses are one of the most frequent skin diseases of human, pets and livestock [3]. The disease is widely distributed all over the world with various degrees and more common in men than in women. There are three genera of mould that cause dermatophytosis. These are *Epidermophyton*, *Trichophyton* and *Microsporum*. Contagiousness among animal communities, high cost of treatment, difficulty of control and the public health consequences explain their great importance [4]. A wide variety of dermatophytes have been isolated from animals, but a few zoophilic species are responsible for the majority of the cases, viz. *M. canis*, *T. mentagrophytes*, *T. equinum* and *T. verrucosum*, as also the geophilic species *M. gypseum* [5]. Dermatophytes are named based on the Greek word for skin plant and are common label for a group of three (3) types of fungus that commonly caused skin diseases in animals and human, these anamorphic genera are : *microsporum*, *Epidermophyton* and *Trichophyton*. There are about Fourty (40) species in these three (3) Genera (Anonymous, 2011).

Dermatophytes cause infections of the skin, hair and nails due to their ability to obtain nutrient from keratinized materials, the organisms colonizes the keratin tissue and inflammation is caused by host response to metabolic byproducts, they are usually restricted to non-living cornfield layer of the epidermis because of their inability to penetrate viable tissue of an immune competent host [6].

There is world-wide report on the emergence of antifungal antibiotics resistant of certain fungal isolates [7]. The analysis of fungal isolates and their resistance to antifungal substances will go a long way to discourage indiscriminate use of antifungal antibiotics in the treatment of the infected farmers.

The development of standardized methodology for antifungal susceptibility testing is another recent advance in the laboratory evaluation of *Aspergillus* species. Interpretive breakpoints have not been established for any of the antifungal agents against filamentous fungi. However, new developments through the Clinical and Laboratory Standards Institute provide reproducible methods for antifungal susceptibility testing. Further studies using these in vitro methods may lead to improved rationale for selection of antifungal compounds in the treatment of invasive aspergillosis. Although azoles resistance by *Aspergillus* species is unusual, patients exposed chronically to antifungal triazoles have been reported to have refractory infection caused by isolates with elevated MICs [8,9].

This study aimed to determine the most appropriate antifungal to be used against most frequently isolated fungal pathogens in the treatment of Dermatophytoses in the study area.

## MATERIALS AND METHODS

Studies on fungi associated with human skin and vegetable diseases in Sokoto Metropolis were carried out in Sokoto Metropolis of the Sokoto State. Sokoto is the capital city of the State, lies between latitude 13° 3' 490N, longitude 5° 14' 890E and at an altitude of 272 m above the sea level. It is located in the extreme North Western part of Sokoto North and South local government areas and also some parts of Kware LGA from the North, Dange Shuni LGA from South and Wamakko LGA to the West. Sokoto metropolis is estimated to have a population of 427,760 people [10]. Occupation of city inhabitants includes Farming, trading, commerce, with a reasonable proportion of the population working in private and public sectors [11].

Samples were collected from the slanted bottles, preserved in mycology lab of Biological Sciences Department, Usmanu Danfodiyo University. They were *Trichophyton rubrum*, *Trichophyton mentagrophyte*, *Microsporium audouinii*, *Microsporium gypseum* *Aspergillus niger*, *Aspergillus flavus* and *Aspergillus fumigatus*

Similarly, four brands of antifungal creams namely, Ketoconazole, Clotrimazole, Funbact-A and Endix G frequently used against dermatophytes were purchased from Amanawa General Hospital pharmacy unit.

Qualitative testing for antifungal activity of seven (7) fungal isolates were determined by agar well method which was carried out according to the procedure of Collins *et al.*, [12, 13].

Forty two grams (42g) of Potato Dextrose Agar was prepared and allowed to solidify as the medium for testing the isolates and cork borer of 12mm in diameter was also used. Four wells were made in each Plates of Potato Dextrose Agar with a sterilize 12mm in diameter cork borer. On each of the four wells created in the PDA plates, the wells were aseptically filled by using different syringe of different creams. The plates were left standing in a work bench for two (2) minutes to allow the creams to settled, each plates was then seeded with a test organisms at the centre of the plate. Antifungal cream fluconazole was used as positive control while 30% methanol in water was

used as negative control. The plates were then incubated at room temperature for two (2) weeks. Evidence of growth around the well indicated antifungal activity against the fungal pathogens. The diameter of the growth were measured and valued for each test organism was recorded [6].

Results were analyzed by three-factor analysis of variance with interactions. The P values and resulting conclusions were similar for all forms of analysis, significant level  $P = 0.05$  (using general linear model procedure) were performed using Minitab for Windows, release 14.2 (Minitab Inc., State College, PA).

## RESULTS

Seven (7) most predominant isolates that belong to three (3) genera were tested with four (4) selected antifungal creams that are frequently used in the treatment of fungal skin diseases. The sensitivity profile of the isolates is presented in table 1

*Trichophyton rubrum*, *Microsporum audouinii* and *Microsporum gypseum* were found to be sensitive to all tested antifungal creams, as *Trichophyton mentagrophyte* isolates were positive to all antifungal tested. All species of the genus *Aspergillus* were resistance to ketoconazole and susceptible to Endix G cream, Clotrimazole and Funbact-A respectively.

**Table 1: Species of fungi isolated from infected human skin in Sokoto Metropolis**

| S/N | Isolates                |
|-----|-------------------------|
| 1.  | <i>A. niger</i>         |
| 2.  | <i>A. flavus</i>        |
| 3.  | <i>A. fumigatus</i>     |
| 4.  | <i>T. rubrum</i>        |
| 5.  | <i>T. mentagrophyte</i> |
| 6.  | <i>M. gypseum</i>       |
| 7.  | <i>M. audouinii</i>     |

**Table 2: Antifungal Sensitivity Profile**

| Species                 | Ketoconazole | Endix G | Clotrimazole | Funbact-A |
|-------------------------|--------------|---------|--------------|-----------|
| <i>T. rubrum</i>        | S            | S       | S            | S         |
| <i>T. mentagrophyte</i> | R            | R       | R            | R         |
| <i>M. gypseum</i>       | S            | S       | S            | S         |
| <i>M. audouinii</i>     | S            | S       | S            | S         |
| <i>A. niger</i>         | R            | S       | S            | S         |
| <i>A. flavus</i>        | R            | S       | S            | S         |
| <i>A. fumigatus</i>     | R            | S       | S            | S         |

### Key

**S** = Susceptible

**I** = Intermediate

**R** = Resistant

## DISCUSSION

Results from this study, indicates that these seven (7) fungal pathogens were include:- *A. niger*, *A. fumigatus*, *A. flavus*, *T. rubrum*, *T. mentagrophyte*, *M. Gypseum* and *M. audouinii*, were found to be the causes of human mycotic skin infection. Is in agreement with the findings of Mahmoudabadi, [5] who reported *T. rubrum*, *T. mentagrophyte*, *M. Gypseum* and *M. audouinii* as fungal pathogens associated with human skin diseases. The finding was also in conformity with the report of Hasegawa [14], who reported species of dermatophytes and *candidas* are responsible for human skin diseases.

Antifungal susceptibility test in this study indicates that *T. rubrum* *M. audouinii* and *M. gypseum* were found to be sensitive to all tested antifungal creams, commonly used in the treatment of fungal skin diseases that is Ketoconazole, Endix G cream, Clotrimazole and Funbact-A, result obtained is in line with the finding by Jansen *et al.* [15] on the effects of Saperconazole on the morphology of *C. albicans*, *P. ovale* and *T. rubrum* in vitro which indicate the sensitivity of Clotrimazole and funbact A. As *T. mentagrophyte* isolates were positive to all tested antifungal. All species of the genus *Aspergillus* were resistance to ketoconazole but sensitive to Endix G cream, Clotrimazole and Funbact-A. These results are in keeping with other studies that show intrinsic resistance to antifungal agents by *Candida* and *T. mentagrophyte* species is largely predictable based on accurate identification of the organism. Resistance to amphotericin B and the *echinocandins* is uncommon, while resistance to the azoles is largely confined to these isolates, [16].

Therefore, such results are of a significant value that confirms the therapeutic potency of some creams used as synthetic medicine. It should form a good basis for further chemical and pharmacological investigation [17]. In addition, combinations of these newer antifungal agents with older agents can be better rationalized since each of the individual drugs has a different mode of action. These antifungal drug combinations will likely offer novel alternative therapeutic approaches for refractory fungal infections.

## CONCLUSION

The presence study showed that many fungal pathogens are associated with human skin and have been indiscriminate as the causes of skin disease. Antifungal susceptibility test revealed three (3) creams namely Endix G, Clotrimazole and Funbact-A had higher efficacy to the tested isolates. The fungal isolates show resistance to ketoconazole. This may have confirmed creams activity on the treatment of skin fungal infection.

1. Therefore, this study recommended the susceptibility of Endix G, clotrimazole and Funbact A, for the treatment of Dermatophytoses.
2. There is the need for further investigation to determine the antifungal compounds in such creams as well as its formulation to be applicable as alternative methods to be used in treatment of skin and skin structures diseases in humans and animals.

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