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RESEARCH ARTICLE

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ANTIFUNGAL ACTIVITY OF SABA COMORENSIS (BOJER EX A.DC.) PICHON AGAINST CANDIDA ALBICANS AND ASPERGILLUS FUMIGATUS

ABSTRACT

Saba comorensis is a reputed medicinal plant used in Côte d'Ivoire, West Africa for the treatment of many diseases. The aim of this study was to evaluate the antifungal activity of this plant against fungi from human origin.

Aqueous, methanol, butanol, chloroform, ethyl acetate and residual extracts from Saba comorensis fresh and dried bark were tested for their antifungal activity against 2 fungus strains (Candida albicans and Aspergillus fumigatus).The assays were performed using the agar dilution method at serial concentrations ranging from 25 to 0.39 mg/ml.

Apart the aqueous extract, the other extract exhibited a net activity on both germs.
At the end of this study, we can say that Saba comorensis has also antifungal property.

Keywords: Saba Comorensis, Plant extract, antifungal activity, Côte d'Ivoire

1. INTRODUCTION

Infectious diseases are the leading causes of death worldwide. Fungal infections are the most frequent [1]. Genera Candida and Aspergillus are respectively responsible of 70-90% and 10-20 % of invasive fungal infections. Candida is one of the pathogens which are frequently isolated from blood cultures. Candida albicans remains the predominant species of all candidiasis[2]. Invasive fungal infections typically occur in a context of severe immunosuppression[3]. HIV infection remains one of the most important factors that favor opportunistic infections altered immune defenses[4; 5; 6]. Treatment of fungal infections is difficult not only on the surgical plan but also from the point of view chemotherapeutic. Antifungal molecules available that can kill or stop the growth of germs are in limited numbers. Some are very toxic to human cells[7; 8]. Others are met strong resistance from some pathogenic strains.

So there is a need to search for alternatives. The screening of plant extracts has been of great interest to scientists in the search for new drugs for greater effective treatment of several diseases[9].

The use of natural products with therapeutic properties has a long history, plant, animal, and mineral products were the main source of medicines[10]. Many efforts have been made to discover new antimicrobial compounds from various kinds of sources such as micro-organisms, animals, and plants. Systematic screening of them may result in the discovery of novel effective antimicrobial compounds[11]. For this study, our choice fell on Saba comorensis. Also called Landolphia florida benth or Landolphia comorensis, Saba comorensis is widespread in tropical and eastern Africa (Senegal to Cameroon) but also in South Africa and West Africa including Côte d'Ivoire and Guinea Conakry. There are several species including synonyms Saba senegalensis, Landolphia hirsuta, landolphia angolensis, Landolphia bruneeli, etc ....[12; 13].

In traditional medicine, this plant is used to cure many diseases. These are among other anorexia, upset stomach, food poisoning, tuberculosis, vomiting, generalized edema, child malnutrition, frontanelles, infertility, burns, lung diseases, headache, cough, diarrhea, dysenteric. It is also used as a laxative, anti-healing and anti-inflammatory[14; 15].

The present study investigates the effects of S. comorensis against fungi from human origin.

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2. MATERIALS AND METHODS

2.1. Collection of plant materials

C. comorensis bark were collected in Cocody, Côte d'Ivoire (West Africa) and identified by Pr Aké-Assi of the Department of Botany, Félix HOUPHOUET-BOIGNY University. A voucher specimen is deposited in the herbarium of Centre National de Floristique (CNF) of Abidjan.

2.2. Extraction of the sample

The freshly bark of the plant were collected. Five hundred grams (500g) of fresh bark were brought to boil in distilled water for 15 minutes then filtered and evaporated using a rotary evaporator. This provides the aqueous extract (SC1). The rest of the fresh barks were air dried at room temperature for 7 days and powdered.

One hundred grams (100 g) of the dry powder was dissolved in 500 ml of methanol (80%), after thorough mixing, the supernatant was evaporated using a rotary evaporator. We obtain the methanol extract (SC_2).

Twenty five grams (25 g) of SC_2 was dispersed in 500 ml of a solution (made up of 250 ml of butanol and 250 ml of distilled water), and mixed for 24 H with constant stirring. From the two phases formed, the supernatant was evaporated using a rotary evaporator, and the resulting dry powder was taken as the butanol extract ($SC_{2\text{-}1}$). The residual phase was mixed with 250 ml of chloroform for 24 H. The supernatant was evaporated and we obtain the chloroform extract ($SC_{2\text{-}2}$). The residual phase was mixed with 250 ml of ethyl acetate for 24 H. The supernatant was evaporated and give the ethyl acetate extract ($SC_{2\text{-}3}$). The residual phase was evaporated too and we obtain the residual extract ($SC_{2\text{-}4}$).

2.3. Microbiological assay

The antifungal activity of C. comorensis was evaluated against 2 strains of fungi, provided by the Pasteur Institute of Côte d'Ivoire. The strains were clinical isolates of the following species: Candida albicans and Aspergillus fumigatus.

The antifungal activity was assessed according to the agar dilution method[16] on Sabouraud agar (Difco). Plant extracts were dissolved in dimethylsulfoxide and diluted to give serial twofold dilutions that were incorporated into growth medium. The resulting concentrations ranged from 25 to 0.39 mg/ml. Sabouraud agar plates were inoculated with 0.2 ml of fungi strain. The plates were incubated in triplicate over a period of 48 H at 30 °C. Ketoconazale were used as positive control. The minimal inhibitory concentration (MIC), defined as the lowest concentration that produced no visible fungal growth after the incubation time and the IC_{50}, was recorded.

3. RESULTS AND DISCUSSION

The obtained results are shown in Tables I and II.

In this study, we evaluated the antifungal activity of various extracts from Saba comorensis against two types of fungi: a yeast-fungus (Candida albicans) and a filamentous fungus (Aspergillus fumigatus). The antifungal activity is more pronounced for Aspergillus fumigatus than Candida albicans.

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The aqueous extract (SC_1) is less effective with antifungal undetermined parameters for C. albicans (MIC; IC_{50}) and for A. Fumigatus (MIC). In a previous study Tra Bi et al. also showed that aqueous extracts of Erigeron floribundus had no effect on Epidermophyton floccosum, Microsporum langeroniise, Trichophyton rubrum, Trichophyton soudanense and Scopulariopsis brevicaulis.[17]

The butanol extract (SC_{2-1}) has the best antifungal activity (IC_{50} = 2 ± 0.6 mg/ml; MIC = 12.5 mg/ml) for C. albicans and (IC_{50} = 0.75 ± 0.14 mg/ml; MIC = 3.75 mg/ml) for A. fumigatus. This means that Saba comorensis possess antifungal properties and the butanol is the best solvent for the extraction of antifungal active principles. Compared to Ketoconazole, the activity of the butanol extract is far lower. But what encouragingly is that our extract is raw and we can improve it with more advanced methods

The results of this study also allow that Saba comorensis can be used as an antifungal against Aspergillus fumigatus and Candida albicans in traditional usage; however decoction (SC_1) will not be the most appropriate.

EXTRACTS	IC_{50} (mg/ml)	MIC (mg/ml)
Aqueous (SC_1)	Indetermined	Indetermined
Methanol (SC_2)	5.75 ± 2.4	25
Butanol (SC_{2-1})	2 ± 0.6	12.5
Chloroform (SC_{2-2})	20 ± 4.6	Indetermined
Ethyl acetate (SC_{2-3})	4.5 ± 1,3	25
Residual (SC_{2-4})	6.75 ± 2,1	Indetermined
Ketoconazole	0.0096 ± 0.0015	0.048

Table I: Antifungal activity **(CI_{50}, CMF) Saba comorensis and Ketoconazole on C. albicans**

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EXTRACTS	C_{510} (mg/ml)	MIC (mg/ml)
Aqueous (SC_1)	3.75 ± 1,9	Indetermined
Methanol (SC_2)	1 ± 0.3	6.25
Butanol (SC_{2-1})	0.75 ± 0.14	3.125
Chloroform (SC_{2-2})	2 ± 0.5	25
Ethyl acetate (SC_{2-3})	3 ± 1.7	12.5
Residual (SC_{2-4})	6.25 ± 2.8	Indetermined
Ketoconazole	0.0011 ± 0,0009	0.003

Table II: Antifungal activity **($CI_{50,}$ CMF) of Saba comorensis and Ketoconazole on A. fumigatus**

4. CONCLUSION

This preliminary evaluation indicated that the butanol bark extract of Saba comorensis has significant activity against the test fungal strains used. Further studies are necessary to identify the main active constituents. The results of this study give some scientific credence to the indigenous uses of the Ivorian medicinal plants evaluated for the treatment of skin disorders.

5. ACKNOWLEDGEMENT

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6. DECLARATION OF CONFLICT OF INTEREST

The authors wish to declare that there is no conflict of interest.

7. REFERENCES

1. Pfaller M. A. and diekema D. J. Epidemiology of invasive candidiasis: a persistent public health problem. Clin Microbiol Rev., Iowa, Etat- Unis. 2007; 20: 133-163.
2. Beck-Sague C. M. and Javis W. R. The national nosocomial infection surveillance system. Secular trends in the epidemiology of nosocomial fungal infections in the United States. J. infect dis. 1993 ; 167: 1247-1251
3. Chabasse D. Les nouveaux champignons opportunistes apparus en médecine. Rev. générale. J. Myco. Méd.1994. 4 : 9-28.
4. KRA A. K. M. Evaluation et amélioration par séquençage chromatographique d'une action antifongique de MISCA contre Aspergillus fumigatus. Thèse de doctorat 3eme cycle UFR Biosciences Université Abidjan Cocody 126p. 2001
5. Ouattara S., Kra A. K. M., Kporou K. E., Guede-Guina F. Evaluation de l'activité antifongique des extraits de Terminalia ivorensis (TEKAM$_2$) sur la croissance in vitro de Aspergillus fumigatus. Bulletin de la Société Royale de Liège. 2009 ; 78: 302-310.
6. Besson P. G. Encyclopédie scientifique et technique. Trois fontaines, Lausanne, Belgique. 5 : 239p. 1987
7. White M. H. The contribution of fluconazole to the changing epidemiology of invasive Candida infection. Editorial response: Clinic Infect. Deseases. 1997; 24: 1129-1130
8. Tomoko N, Takashi A, Hiromu T, Yuka I, Hiroko M, Munekaju I et al. Antibacterial activity of extracts prepared from tropical and subtropical plants on methicillin-resistant Staphylococcus aureus. J. Health Sci., 2002; 48: 273–276.
9. Kao MJ. Encyclopedia of Chinese Material Medica; Shin Wen Feng Press: Taibei, China, 1980.
10. Dimayuga RE, Garcia SK. Antimicrobial, screening of medicinal plants from Baja California sur, Mexico. J Ethnopharmacol, 1991; 31: 181-192.
11. Kokwaro O. G. Medicinal plants of Africa; EAST African literature bureau, Kampala, Nairobi, DAR ES Salam, 368p. 1976
12. Beauvois P. and Person J. G. M. African species of Landolphia. (Eds) From series of revision of Apocynaceae: Wageningen Agricultural University papers, Netherlands. 1992; 92: 6754-6761.
13. Nacoulma O. O. G. Plantes médicinales et pratiques médicales traditionnelles du Burkina Faso: Cas du plateau centrale. Thèse de doctorat des Sciences Naturelles option biochimie de l'Université du Burkina Faso.206p. 1996
14. Arbonnier M. Arbres, arbustes et lianes des zones sèches d'Afrique de l'ouest. Edition 2, CIRAD-MNHN. Montpellier, France ; 167p. 2002
15. Favel A, Steinmetz MD, Regli P. In vitro antifungal activity of triterpenoid saponins. Planta Med 1994; 60: 50-53.
16. FH Tra Bi, MW Koné, NF Kouamé : Antifungal activity of Erigeron floribundus
17. (Asteraceae) from Côte d'Ivoire, West Africa Tropical Journal of Pharmaceutical Research, June 2008; 7 (2): 975-979

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