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RESEARCH ARTICLE

ACTIVITY OF AN EXTRACT OF GRAPEFRUIT SEEDS (*CITRUS PARADISI*) ON THE GROWTH OF *CANDIDA ALBICANS*

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ABSTRACT

With the aim of complementing the efforts of modern medicine against viral, bacterial, parasitic and fungal diseases, the plant extract of hydroalcoholic grapefruit seed extract (*Citrus paradisi*) was tested on the *in vitro* growth of *Candida albicans*. Antifungal tests were carried out on Sabouraud medium, to which the plant extracts were incorporated using the double dilution method in inclined tubes. Results showed that *Candida albicans* was sensitive to the 70% hydroethanolic extract of Citrus paradisi in a dose-dependent manner. The hydroethanolic extract may be a source for the development of Traditional Improved Medicines (TIMs) against skin mycosis.

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INTRODUCTION

Plants have always been a source of medicines. Even today, a majority of the world's population, particularly in developing countries, relies on traditional herbal remedies (1). Flora has already contributed enormously to the discovery of many of the active principles used in the preparation of numerous medicines, and continues to do so. Indeed, the modern pharmaceutical industry itself continues to draw on the diversity of secondary plant metabolites to find new molecules with biologically active properties(2),(3).Unfortunately, despite all the efforts made by the medical profession, infectious diseases have been on the increase in recent years. In terms of mycoses, candidiasis is a very frequent infection in 1subjects living with HIV. Susceptibility to antifungal agents is declining in certain Candida strains, due to drug pressure, mutation phenomena and the sharp rise in opportunistic infections (4). With the aim of helping people to treat themselves cheaply and safely, research has begun into the pharmacological activity of various medicinal plant extracts. Such is the case with *Citrus paradisi*, a rutaceae on candida. Grapefruit seed extract (*Citrus paradisi*) has enjoyed phenomenal success in the United States, being used both curatively and preventively in men to treat a wide range of ailments (5),(6),(7).

MATERIALS

Biological material

- The plant material is a plant powder obtained from grapefruit (*Citrus paradisi*) seeds (Figure 1). These samples were collected in Soubre region (Ivory Coast) in december 2023.

Germ tested: The germ tested was *Candida albicans*, which was inoculated into sabouraud agar commonly used for fungal growth.

METHODS

Harvesting and conditioning plant material: Grapefruit (Citrus paradisi) seeds were harvested, washed and dried in the sun at room temperature (25-30°C) for two weeks in the laboratory. The dried seeds were then ground to powder using an electric grinder.

Preparation of ethanolic extract 70%.

A quantity of 100 grams of grapefruit seed powder was dissolved in a mixture of 1000mL solvent consisting of 700Ml

Figure 1. Grapefruit tree *(Citrus pardisi)*

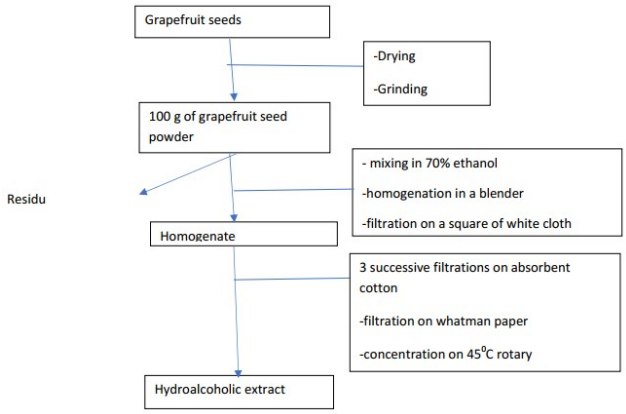

Figure 2. Hydroalcoholic extraction method

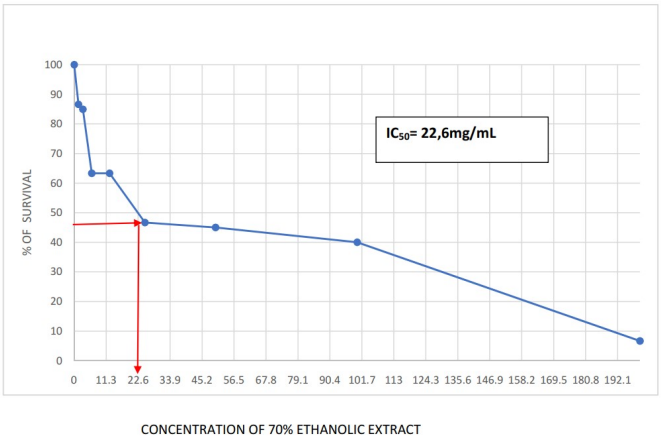

Figure 3. Growth inhibition curve for *candida albicans* as a function of 70% dry ethanolic extract concentration

ethanol and 300mL distilled water, then homogenized in a Blender at room temperature (1),(8),(9). The resulting homogenate was first wrung out in a square of white cloth. It was then successively filtered through absorbent cotton. The filtrate obtained was oven-dried at 50°C for 48 h (10),(11) to give the 70% hydroethanol extract. The mass of extract obtained was stored in clean, dry, sterile urine dishes, then kept in a cool, dry place. Sabouraud culture medium was prepared according to the supplier's instructions.

A quantity of 5.04 g of Sabouraud agar was homogenized in 120 mL of distilled water. For in vitro testing, the medium was poured into test tubes, into which the extract was incorporated. Plant extracts were incorporated into Sabouraud agar using the double dilution method in inclined tubes**.** Each series comprises 10 test tubes numbered from 1 to 8 and 2 control tubes (one coded TC, used as a control for germ growth; the other, TS, as a control for culture medium sterility). The concentration range varies from 100mg/mL to 0.78 mg/mL. After incorporation of the extract, all tubes are autoclaved at 121°C for 15 minutes and then tilted with the pellet at room temperature to allow cooling and solidification of the agar.

Inoculum preparation: A germ oese was homogenized in 10 mL of sterile distilled water (10° concentration). A second suspension (10^{-1}) was prepared by taking 1mL from the 10° suspension and adding it to the 9 mL of distilled water to obtain a final volume of 10 mL. This will be used for the various tests.

Antifungal tests in the presence of plant extract: 10 µL of suspension 10^{-1} is sown in transverse streaks until exhaustion on tubes (1 to 8 and TC). This corresponds to 1000 seeded cells. The resulting cultures were incubated at 30°C for 48 h with *Candida albicans*(12);(13).

RESULTS

The results of the various tests are shown in figure 3, which is the antifungigram chart. The appearance of the cultures is shown in figure 4. The sterility control tube, which contains no germs, proves the sterility of the medium used. The culture control tube shows not only the appearance, but also the maximum number of colonies obtained for normal germ growth.

DISCUSSION

Given the hype surrounding grapefruit seed extract and the therapeutic promises it brings, it seems necessary to bring a critical sense to bear on its action and use. First of all, the scientific literature evoking the antimicrobial, immunostimulant and antioxidant activities of these extracts is not yet available (14). It is also richer in vitamin C and flavonoids, both in the seeds and in the juice (USDA, 2014). However, the most widespread route to industrial valorization remains the extraction of essences and essential oils, which can be used as an alternative to synthetic fungicides (5). The appearance of the cultures is shown in figure 8. The sterility control tube, which contains no germs, proves the sterility of the medium used. The culture control tube shows not only the appearance, but also the maximum number of colonies obtained for normal germ growth. The antifungal chart is obtained from the colony count data in the various experimental tubes Generally speaking, the 70% grapefruit seed extract tested was more or less active and inhibited the in vitro growth of *Candida albicans*. There was a progressive drop in colony numbers as extract concentrations increased in the experimental tubes. The curve shows a decreasing trend.
The concentration range chosen is between 100 mg/mL and 0.78 mg/mL. The Minimum Fungicidal Concentration (MFC) value is above 100 mg/mL with a concentration for 50% inhibition (IC50) value equal to 22.6 mg/mL.

This performance is inferior to that of the 70% hydroalcoholic extract of Terminalia ivorensis on Candida albicans with a Minimum Fungicidal Concentration (MFC) value of 90 µg/mL.(15)La fraction F1 de *Mitracarpus scaber*, une Rubiacée, a donné une valeur CMF de 150 mg/mL sur *Candida albicans* et une concentration pour une inhibition de 50 % (CI50) de 3 mg/mL (16). Similarly, the work of(17)with hydroalcoholic extract of *Enantiapolycarpa*, an anonaceous plant, was more active, based on antifungal parameter values (CMF= 3.125 mg/mL and IC50=1.50 mg/mL).Work by (18) using dried fruits of *Solanum anguivi*, a Solanaceae, gave antifungal parameter values (CMF= 200 mg/mL and IC50=12 ;5 mg/mL) still on *Candida albicans*.

CONCLUSION

This study shows that hydroethanol extract of grapefruit seeds effectively inhibits the *in vitro* growth of *Candida albicans*.

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CONFLICTS OF INTEREST

The author declares no conflict of interest regarding the publication of this article.

RÉFÉRENCES

1.Zirihi, GN.; Kra, AKM &Guédé-Guina F. 2003.Evaluation of the antifungal activity of *Microglossapyrifolia* (LAMARCK) O. KUNTZE (ASTERACEAE) "PYMI" on the *in vitro* growth of *Candida albicans*. *Review of Méd. and Pharm. Afr.*

2.KRA, AKM. 2001. Evaluations and improvements by chromatographic sequencing of an antifungal action of MISCA against *Aspergillus fumigatus*. Thesis. Bioch. UFR Biosciences. University. Abidjan. 126 pages

3. Ouattara, S.,Kra, AKM., Kporou, KE., Zirihi, GN., Yapi, HF., N'guessan, JD., DjamanAJ. 2013Comparative study of chromatographic fractions activities of *Terminalia ivorensis* and ketoconazole as standard antifungal on *in vitro* growth of *Trichophyton mentagrophytes* var. *interdigitaleJournal of Drug Delivery & Therapeutics*; 3(5), 18-21

4.Dieng, Y.; Niang, MAF.; Ndour-Diop, A.; Sow, PS.; Dieng, T.; Soumare, M.; Bah, IB.; Faye, O.; Diop, BM.; Gaye, O.; Ndir, O., & Diallo, S., 2005. Antifungal susceptibility of candida strains responsible for oropharyngeal candidiasis in subjects living with HIV. *Sidanet* 2(3) :835.

5.Tian, 2001. Root-derived inputs are major contributors to soil carbon in temperate zones. *A Biochemistry reviews*. 133,97-107.

6.Tonelli, N.,&Gallouin, F. - 2013 - Edible fruits and seeds from around the world Ed. Lavoisier.

7.Cvetnic, Z. & Vladimir-Knezevic, S. - 2004 - Antimicrobial activity of ethanolic grapefruit seeds and pulp 163 extract - *Acta pharmaceutica* - Tome 54 - p. 243-250.

8. Kporou,KE., Ouattara, S., Adela, P., Coulibaly, I., N'guessan, JD. 2018Polyphenolic content of a methanolic extract of *Mitracarpusscaber*Zucc. and their antioxidant and antifung*al* activities (Rubiaceae).*The Journal of Phytochemistry*. 109 (2018) 139-148

9. Ouattara, S, Kporou,KE. YAO, K., Kra, AKM.,N'guessan, JD.,and Djaman AJ. 2018 Assessment of aqueous and ethanolic extracts antifungal activity from stem barks of *Enantiapolycarpa* (Annonaceae) on *Candida albicans, Aspergillus flavus, Aspergillus niger and Cryptococcus neoformans*, *Int. J. Adv. Res. 6(3), 648-657*

10.Kra, AKM., 1997. Evaluation of the effects of a new anti-aspergillary from a natural source. DEA of Biotechnology, option Pharmacology - Microbiology, UniversityofCocody, Abidjan 30 pages.

11.Thes. PM.2009 Investigation of the antimicrobial profile of G243 and MISCA oils on some skin mycosis agents. DEA dissertation. University of Cocody. UFR Boisciences. Abidjan. Ivory Coast, 30pp.

12. Kporou,KE., Ouattara, S., Gbogbo, M., Gouedji,YP., Kra, AKM., and Djaman AJ. 2021Quality, safety and activity of an ointment formulated from *Butyrospermumparkii*and*Ricinus communis* oils on rabbits hair growth *Review ofRAMReS – Range Pharm. Méd. Trad. Afr.*, 20(1): 38-46

13.Konan, GKNA., Kra, AKM., Ouattara, S., Kple TKM., Bolou, GEK., Monney, YU., Lidji, CJSR., Kouame, CC., N'guessan, JD.,and Djaman AJ. 2022Study of wound healing and the anti-inflammatory and antioxidant activities of a fraction derived from the hydroethanol extract of *Terminaliaivorensis* (Combretaceae) on Wistar rats.*RAMReS review– rangePharm. Méd. Trad. Afr*., 21(2): 83-92

14. Ouattara, S., Kporou, KE., Kra, AKM., Appia, FHD., Yapo, AF., N'guessan, JD., and Djaman AJ. 2024 A Comparative Study of the Antifungal Activity of Fresh and Dried *Solanum anguivi*Fruits on *Candida albicans* and Trichophyton rubrum*Euro. J. Med. Plants, vol. 35, no. 1, pp. 26-34.*

15. Ouattara, S., N'guessan, CDR, Bagre, I., Kporou,KE., Kra, AKM., Djaman AJ. 2020. Formulation of an ointment from hydroethanolic Extract of *Terminalia ivorensis*and therapeutic trial on volunteers with moths.*J. Nat. Prod. Resour*. - Volume 6 Issue 2, 262–264

16.Kporou, KE., Kra, AKM., Ouattara, S., and Guede-Guina, F., 2010. Evaluation of antifungal activityof *Mitracarpusscaber*, a rubiaceae MISCA codified on *Candida glabrata*

17. Ouattara, S., Bagre, I.,Kporou, KE., Soro, YD., Kra, AKM., and Djaman AJ.2022Comparative study of hydroethanolic extract of *Terminalia mantaly*on *Staphylococcus aureus* ATCC and *Salmonella typhi.World Journal of Advanced Pharmaceutical and Life Sciences*, 03(02), 011–015

18Ouattara, S., Kporou, KE., Kra, AKM., Appia, FHD.,Yapo, AF., Djaman AJ.2023

Antifungal Activity of *Solanum anguivi* Lam (Solanaceae) on *Candida albicans. Sch Acad J Biosci,* 11(10): 375-380.

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