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IN VITRO ANALYSIS OF ANTIFUNGAL ACTIVITY OF *ALOE VERA* EXTRACT AND ALOIN ON *CANDIDA ALBICANS*

Shobhna Tiwari[1]* and Dr. M. K. Gupta

[1]Department of Microbiology Barkatullah University Bhopal, Madhya Pradesh India.

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***Corresponding Author**
Shobhna Tiwari
Department of Microbiology
Barkatullah University
Bhopal, Madhya Pradesh
India.

ABSTRACT

The aim of the study was to analyse, antifungal activity of *Aloe vera* extract and aloin on candida albicans. 4 different solvents were used for the extraction of *Aloe vera* which were extracted in petroleum ether, chloroform, ethyl acetate and 70% methanolic extract. Antifungal activity was tested by well diffusion assay. To determine minimum inhibitory concentration(MIC), agar dilution and broth dilution methods were performed. Each extract was taken in 4 varying concentrations (100mg/ml, 150mg/ml, 200mg/ml and 250mg/ml) to analyse the MIC by agar dilution method, which were further tested by broth dilution method. Among extracts, 70% methanolic extract shows maximum inhibitory action and extracts were compared with aloin which has shown more potent antifungal activity than all the extracts, it is active ingredient of *Aloe vera*. To compare the results fluconazole was taken as standard.

KEYWORDS: Aloe vera, aloin, MIC, agar dilution, tube dilution.

INTRODUCTION

Since ancient time, plants and plant derived products are an integral part of the health care system.[1] Various plants are investigated for their antimicrobial activity, as certain components have the potential to inhibit microorganisms.[2,3,4] *Aloe vera* is a monocotyledonous plant belongs to the family Asphodelaceae.[5] It is indigenous to the Eastern and Southern Africa.[6] The *aloe vera* gel was used to treat number of diseases like gastrointestinal problems, skin disease, constipation, healing wounds and burns etc. Cosmetic, pharmaceutical and food industries also use *aloe vera* gel in their products.[7] The present study was designed for comparative study of antifungal activity of different extracts

(pet ether, chloroform, ethyl acetate and 70% methanol) and aloin active component of *aloe vera*.

Aloe vera- Since ancient times, traditional healers, local dwellers, and vaidyas used many medicinal plants that are considered to be effective in oral fungal infection.[8] Amongst them *aloe vera* is one of the trusted medicines. It is also evident that many individuals using established antimicrobial agents also use traditional medicine along with it.[9] Hence present study was designed to investigate effect of Aloe vera and aloin on *Candida albicans.*

Aloe vera belongs to the Kingdom: Plantae; Division: Magnoliophyta; Class: Liliopsida; Order: Liliales; Family: Asphodelaceae; Subfamily: Asphodeloidceae; Genus: Aloe and Species: A.vera (Aloe barbadensis).

MATERIALS AND METHODS

Collection of plant material- *Aloe vera* leaves were collected from different sites in Bhopal and plant was identified by Dr. Zia Ul Hasan, professor and head, department of botany, Safia college of science, Bhopal.

Extraction: Fresh and healthy leaves were washed in tap water, cut longitudinally, air dried and dried material was coarsely powdered and stored till further use. The coarsely powdered material was used for extraction by soxhlation using solvents of different polarity. The solvent used for extraction were petroleum ether, chloroform, ethyl acetate and 70% alcohol.

In vitro antifungal activity was assessed by Well-Diffusion assay and MIC.[10]

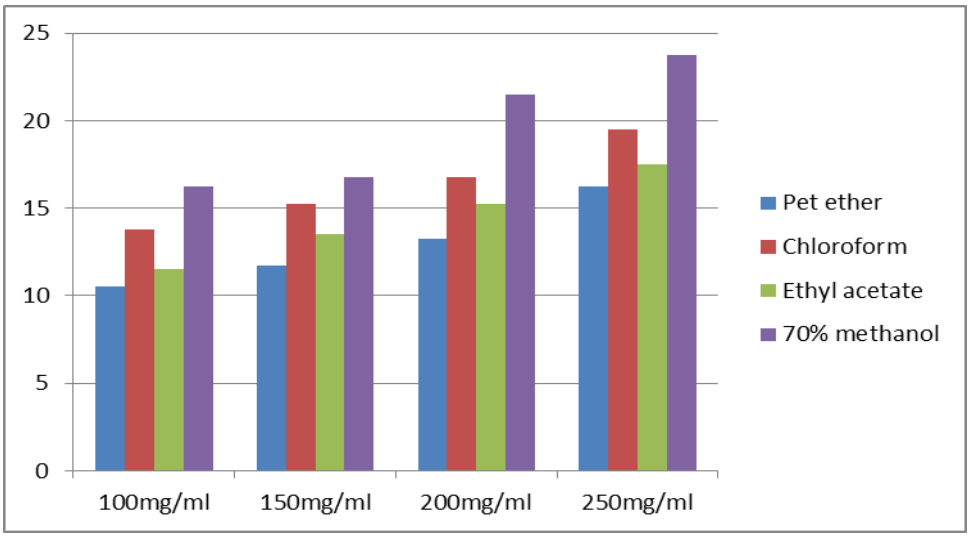
Well-Diffusion

- Fluconazole (standard)
- 4 Extracts at 4 concentrations (100,150,200 and 250mg/ml)
- Aloin at 4 concentrations (25,50,75 and 100mg/ml)

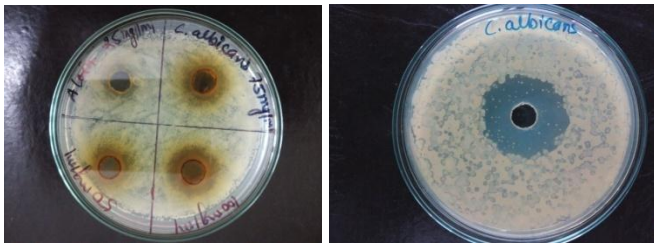
RESULT AND DISCUSSION

Diameter of growth inhibition zone with standard deviation (mm).

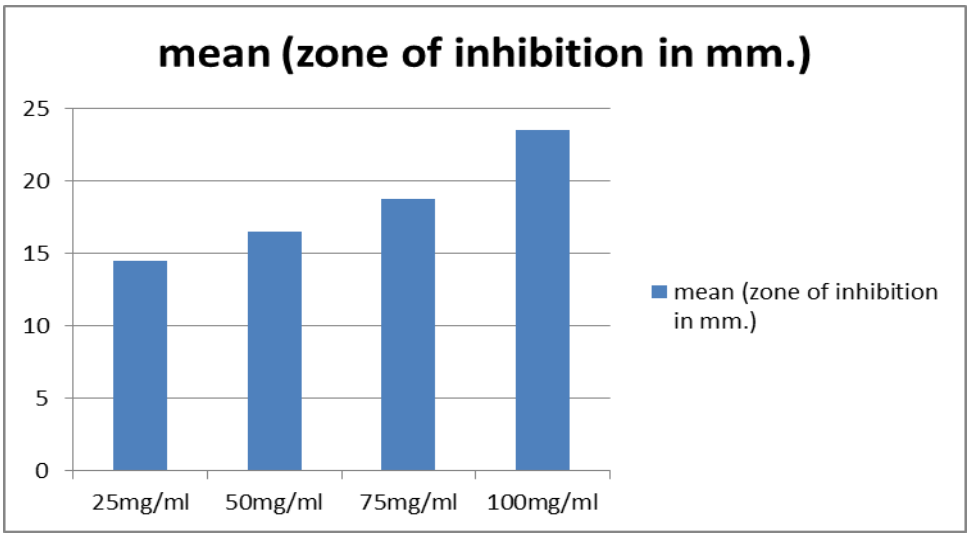
Conc.	Group	Mean±SD(mm)
100mg/ml	Pet ether	10.50±0.577
	Chloroform	13.75±0.500
	Ethyl acetate	11.50±0.577
	70% methanol	16.25±0.500
150mg/ml	Pet ether	11.75±0.500
	Chloroform	15.25±0.500
	Ethyl acetate	13.50±0.577
	70% methanol	16.75±1.893
200mg/ml	Pet ether	13.25±0.500
	Chloroform	16.75±0.500
	Ethyl acetate	15.25±0.500
	70% methanol	21.50±0.577
250mg/ml	Pet ether	16.25±0.500
	Chloroform	19.50±0.577
	Ethyl acetate	17.50±0.577
	70% methanol	23.75±0.500
25mg/ml	Aloin	14.50±0.577
50mg/ml	Aloin	16.50±0.577
75mg/ml	Aloin	18.75±0.500
100mg/ml	Aloin	23.50±0.577
10µg/ml	fluconazole	31.25±0.957



Pet ether | Chloroform | Ethyl acetate | 70% Methanol

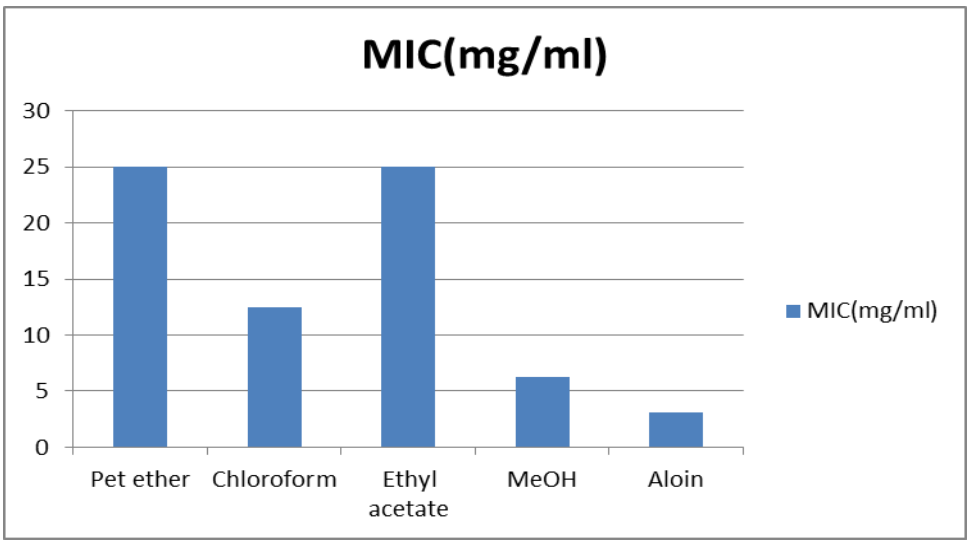


Aloin | Fluconazole



Comparison of MIC of different groups.

Group	MIC
Pet ether	25mg/ml
Chloroform	12.5mg/ml
Ethyl acetate	25mg/ml
70%methanol	6.25mg/ml
Aloin	3.12mg/ml
Fluconazole	0.625µg/ml



DISCUSSION

Candida albicans strains was used in this study. The stationery phase culture of C.albicans MTCC 183 contain about 1×10^8 CFU/ml. We next assessed the zone of inhibition of various extracts of Aloe vera : pet ether, Ethyl acetate, Chloroform and MeOH. At the concentration of 100 mg/ml, zone of inhibition was (10.50mm±0.577, 11.50mm±0.577, 13.75mm±0.500 and 16.25mm±0.500), at 150mg/ml (11.75mm±0.500, 13.50mm±0.577, 15.25mm±0.500 and 16.75mm±1.893), at 200mg/ml (13.25mm±0.500, 15.25mm±0.500, 16.75mm±0.500 and 21.50mm±0.577 and at 250mg/ml (16.25mm±0.500, 17.50mm±0.577, 19.50mm±0.577 and 23.75mm±0.500) for pet ether, Ethyl acetate, Chloroform and MeOH extracts respectively. Vernier calliper was used for the measurement of zone of inhibition. Increase in concentration was directly proportional to the increase in zone of inhibition. Antifungal effect of Aloe Vera may vary according to the solvent. In our study, the antifungal property of methanolic extract of Aloe Vera was more potent than other solvent extract as it has shown maximum inhibitory activity out of 4 different extracts of Aloe vera.

Aloin the isolated component showed zone of inhibition 14.50mm±0.577, 16.50mm±0.577, 18.75mm±0.500 and 23.50mm±0.577mm at the concentrations of 25,50,75 and 100mg/ml respectively, which is showing significant antifungal activity and suggested that it is responsible for the antifungal activity of Aloe vera.

The standard antifungal drug Fluconazole found very effective with zone of inhibition 31.25mm±0.957 at 10µg/ml.

MIC was also assessed by broth dilution method in which pet ether, chloroform, ethyl acetate, MeOH, Aloin and Fluconazole showed 25mg/ml, 12.5mg/ml, 25mg/ml, 6.25mg/ml., 3.12mg/ml and 0.625µg/ml respectively.

The antifungal effect of the extracts in this study was solvent dependent.4 different extracts were tested for the presence of antifungal activity and MIC. There was an increase in the zone of inhibition with the concentration of extract indicating a dose dependent activity. For the alcohol extracts, the mean differences among groups of concentration showed that at higher concentrations there was a greater effect on the mean zone of inhibition.

70% methanolic extract has shown the best results among extracts. Out of 4 different extracts, it has shown maximum zone of inhibition and in MIC it has inhibited the fungal growth at the lowest concentration.

However aloin is more potent antifungal agent than 70% methanolic extract. Since it has been obtained after isolation indicating its purity and efficacy.

CONCLUSION

The present research work may aid in establishing that naturally sourced compounds of *Aloe vera* can be used in formulation of new and more potent antifungal agents against *Candida albicans.* The problem of increasing microbial resistance has made it prudent to identify natural antifungal compounds.

REFERENCES

1. Sofowora, A., Ogunbodede, E., & Onayade, A. (2013). The role and place of medicinal plants in the strategies for disease prevention. *African Journal of Traditional, Complementary and Alternative medicines*, *10*(5): 210-229.
2. Mostafa, A. A., Al-Askar, A. A., Almaary, K. S., Dawoud, T. M., Sholkamy, E. N., & Bakri, M. M. (2018). Antimicrobial activity of some plant extracts against bacterial strains causing food poisoning diseases. *Saudi Journal of Biological Sciences*, *25*(2): 361-366.
3. Nascimento, G. G., Locatelli, J., Freitas, P. C., & Silva, G. L. (2000). Antibacterial activity of plant extracts and phytochemicals on antibiotic-resistant bacteria. *Brazilian journal of microbiology*, *31*(4): 247-256.
4. Bhalodia, N. R., & Shukla, V. J. (2011). Antibacterial and antifungal activities from leaf extracts of Cassia fistula l.: An ethnomedicinal plant. *Journal of advanced pharmaceutical technology & research*, *2*(2): 104.
5. Kammoun, M., Miladi, S., Ali, Y. B., Damak, M., Gargouri, Y., & Bezzine, S. (2011). In vitro study of the PLA2 inhibition and antioxidant activities of Aloe vera leaf skin extracts. *Lipids in health and disease*, *10*(1): 30.
6. Grierson, D. S., & Afolayan, A. J. (1999). Antibacterial activity of some indigenous plants used for the treatment of wounds in the Eastern Cape, South Africa. *Journal of Ethnopharmacology*, *66*(1): 103-106.
7. Capasso, F., Borrelli, F., Capasso, R., Carlo, G. D., Izzo, A. A., Pinto, L., ... & Longo, R. (1998). Aloe and its therapeutic use. *Phytotherapy Research: An International Journal*

Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives, *12*(S1): S124-S127.

8. Pandey, A. K., & Patra, A. K. (2004). INDIGENOUS KNOWLEDGE AND SUSTAINABLE DEVELOPMENT BY MEDICINAL PLANTS. *Recent Trends In Biotechnology*, 160.
9. Palombo, E. A. (2011). Traditional medicinal plant extracts and natural products with activity against oral bacteria: potential application in the prevention and treatment of oral diseases. *Evidence-Based Complementary and Alternative Medicine*, *2011*.
10. Kumar, S. N., Jubi, J., Nisha, G. V., Asha, A., Dileep, C., & Dileep Kumar, B. S. (2014). Investigation of antifungal activity of stilbenes alone and in combination with fluconazole against Candida albicans. *Int. J. Pharm. Pharm. Sci*, *6:* 304-307.