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A Source of Potential Antifungal Agent: Flower Extracts of Solanum *melongena* L.

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Abstract: The present study was carried out to investigate the antifungal activity of flowers of Solanum melongena L. against fungus Candida albicans. Extracts of varying concentration of flowers of S. melongena L. were prepared with Chloroform , Methanol and Phosphate Buffer . The result obtained revealed the antifungal effect of Phosphate Buffer and Chloroform extracts of flowers of S. melongena L. were effective against Candida albicans. This primary research signifies that extracts of flowers of S. melongena L. (Egg plant) can be utilized as a potential worldwide genetic resource to obtain cheap antifungal drugs in addition to their nutritional value.
Keywords: Solanum melongena L. , Candida albicans, Antifungal activity .

I. INTRODUCTION

Solanum melongena L. (Linnaeus) is widely used in cooking. As a member of the genus *Solanum*, it is related to both the tomato and the potato. It was originally domesticated from the wild nightshade species, the thorn or bitter apple, *S. incanum*,[1][2][13] . It is also known as Eggplant or aubergine is a species of nightshade grown for its edible fruit.

Aubergine *or Brinjal* is a delicate, tropical perennial often cultivated as a tender or half-hardy annual in temperate climates. It grows 40 to 150 cm (16 to 59 in) tall, with large, coarsely lobed leaves that are 10 to 20 cm (3.9 to 7.9 in) long and 5 to 10 cm (2.0 to 3.9 in) broad. Semiwild types can grow much larger, to 225 cm (7.38 ft) with large leaves over 30 cm (12 in) long and 15 cm (5.9 in) broad. The stem is often spiny. The egg-shaped glossy purple fruit has white flesh with a meaty texture. The cut surface of the flesh rapidly turns brown when the fruit is cut open. On wild plants, the fruit is less than 3 cm (1.2 in) in diameter, but very much larger in cultivated forms, reaching 30 cm (12 in) or more in length.

S. melongena L. flowers are either white or purple and have at their centre a bottle-shaped cone of stamens where pollen is held. These flowers are usually solitary and are supported by a 1-3 cm long pedicel (stalk which subtends the flower). Smaller, functionally male flowers appear on the same inflorescence. These flowers are 3-4 cm in diameter and are mostly violet and very rarely white. The anthers are supported by short, thick filaments and have openings at their tips. Color of purple skin of both flowers and fruits of *S. melongena* L. varieties is due to an anthocyanin (nasunin or delphinidin-3-(p-coumaroylrutinoside)-5-glucoside). [4]

In this present research, we found out that *S.melongena* L. flowers can be used to treat *Candida albicans,* which is a dimorphic fungus that grows both as yeast and filamentous cells and one of the few species of the Candida genus that cause the infection candidiasis in humans.[5][6] *C. albicans* is responsible for 50–90% of all cases of candidiasis in humans.[6] Systemic fungal infections (fungemias) including those by *C. albicans* have emerged as important causes of morbidity and mortality in immune-compromised patients (e.g., AIDS, cancer chemotherapy, organ or bone marrow transplantation). *C. albicans* biofilms may form on the surface of implantable medical devices. In addition, hospital-acquired infections by *C. albicans* have become a cause of major health concerns. About 85-95% of vaginal infections cases are responsible for physician office visits every year.[7]

C. albicans is a common member of human gut flora and is detectable in the gastrointestinal tract in 40% of healthy adults.[5][6][7] It is usually a commensal organism, but can become pathogenic in immune-competent individuals under a variety of conditions.[5][6] Overgrowth of the fungus results in candidiasis (candidosis).[5][6] Candidiasis is often observed in immune-compromised individuals, including HIV-infected patients. It commonly occurs on mucous membranes in the mouth or vagina, but may affect a number of other regions. For example, higher prevalence of colonization of *C. albicans* was reported in young individuals with tongue piercing, in comparison to unpierced matched individuals.[8] To infect host tissue, the usual unicellular yeast-like form of *C. albicans* reacts to environmental cues and switches into an invasive, multicellular filamentous form, a phenomenon called dimorphism.[9] In addition, an overgrowth infection is considered superinfection, usually applied when an infection become opportunistic and very resistant to antifungals. It then becomes suppressed by antibiotics. The infection is prolonged when the original sensitive strain is replaced by the antibiotic-resistant strain.[10]

There are over 20 species of *Candida* yeasts that can cause infection in humans, the most common of which is *Candida albicans* which may cause many health related problems to humans like :Irritable Bowel Syndrome (IBS) ,Chronic Sinusitis, Chronic Fatigue Syndrome/Fibromyalgia ,Thrush ,Eczema, or Atopic Dermatitis ,Autism, Leaky Gut Syndrome/Crohn's/Ulcerative Colitis, Interstitial Cystitis (IC),Celiac etc. The main aim of this research was to determine the antifungal activity of *S.melongena* L. flower extracts against *C. albicans* , which is a very infectious fungus.

II. MATERIALS AND METHODS

A. Sample Collection

Solanum melongena L. flowers were collected from House no :7-8 B,New Prem Nagar ,Gwalior , 474002,India and then weighed .

B. Flower extracts

The flowers were washed thoroughly with distilled water. Thereafter ,dried and weighed about 5gm for each extract .Then these flowers were crushed and grinded in Motar and pestel with 5ml of Methanol ,Chloroform and Phosphate Buffer(of pH=7.4) [11]respectively and then centrifuged at 10,000RPM for 5 minutes under aspectic conditions.

C. Test microorganisms

The disease causing strains of *Candida albicans* were used.

D. Generic Drug

Fluconazole (antifungal medication) of same varying concentration were used for the test.

E. Agar diffusion method

The method is suitable for organisms that grows rapidly overnight at 35-37^{0}C The well is made in medium after inoculation with microorganisms. When well is loaded with antibiotics, it diffuses in the medium and inhibits the growth of organism. There is logarithmic reduction in antibiotic concentration. The zone of inhibition of bacterial growth around each well is measured and the susceptibility is determined. Medium-Muller Hinton Agar (3.8gm/100ml of distilled water) was prepared, autoclaved at 121^0 C for 15minutes at 15lbs and poured in sterile petri plates up to a uniform thickness of approximately 5-6mm and the agar was allowed to set at ambient temperature and used. Inoculums-The microorganisms were inoculated in Nutrient broth and incubated at 37^0 C and were used as inoculums. 25 µl of inoculum was spread over the MHA medium, using sterile spreader.

After few minute, five wells were made in each Petri plate and loaded with 4 %,8% .12% ,16% and 20% concentration of *S. melongena* L. flowers extracts (1gm/ml)which were made earlier by Methanol, Chloroform and Phosphate Buffer respectively. Similarly 4 %,8% .12% ,16% and 20% concentration Fluconazole solution was added in another plate. Plates were incubated at 35^{0}C for 24hrs. Antifungal activity was evaluated by measuring zone of inhibition by using Hi-media zone scale.

III. RESULT AND DISCUSSION

The flower extracts of *S. melongena* L. against *Candida albicans* showed variated zone of inhibition.

Table.1. Antifungal activity of *S.melongena* L. Chloroform Extract against *Candida albicans*

Concentration %	Well Diameter (mm)	Zone of Inhibition (mm)	Increase In Zone of Inhibition (%)
4	8	10	25
8	8	10.5	31.25
12	8	11	37.5
16	8	11.5	43.75
20	8	12.5	56.25

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Table.2. Antifungal activity of *S.melongena* L. Methanol Extract against *Candida albicans*

Concentration %	Well Diameter (mm)	Zone of Inhibition (mm)	Increase In Zone of Inhibition (%)
4	8	0	0
8	8	0	0
12	8	0	0
16	8	0	0
20	8	0	0

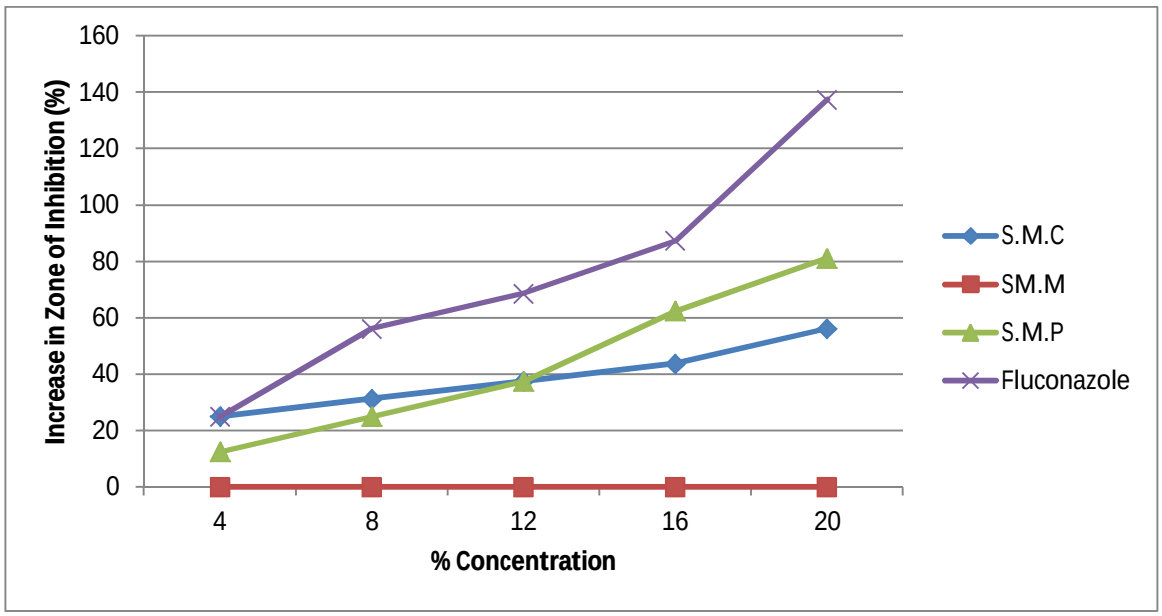
Table.3. Antifungal activity of *S.melongena* L. Phosphate Extract against *Candida albicans*

Concentration %	Well Diameter (mm)	Zone of Inhibition (mm)	Increase In Zone of Inhibition (%)
4	8	9	12.5
8	8	10	25
12	8	11	37.5
16	8	13	62.5
20	8	14.5	81.25

Table 4 : Antifungal activity of Fluconazole against *Candida albicans*

Concentration %	Well Diameter (mm)	Zone of Inhibition (mm)	Increase In Zone of Inhibition (%)
4	8	10	25
8	8	12.5	56.25
12	8	13.5	68.75
16	8	15	87.50
20	8	17	137.5

Graph 1 : Showing Antifungal activity (by % increase in zone of inhibition) of flowers of *S. melongena* L. with different extracts against antifungal activity of Fluconazole .



Here S.M.C is *S.melongena* L. Chloroform Extract ; S.M.M is *S.melongena* L. Methanol Extract and *S.M.P is S. melongena* L. Phosphate Extract .

IV. CONCLUSION

This method employed was simple and showed that antifungal activity of *S. melongena* L. flowers with different extracts can

compete favourably against *Candida albicans* . The best antifungal activity of *S. melongena* L flowers was shown when they were extracted with Phosphate Buffer showing up to 81.25% increase in inhibition zone whereas methanol extract was found to be showing negligible antifungal activity.

This comparative study shows antifungal activity of *S. melongena* L. flowers against *Candida albicans* in usages of extracts in this order Methanol Extract > Chloroform Extract >Phosphate Buffer .

The primary analysis shows that *S. Melongena* L flowers can be used in place of anti-fungal drug such as fluconazole and other drug .

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REFERENCES

[1] Tsao and Lo in "Vegetables: Types and Biology". Handbook of Food Science, Technology, and Engineering by Yiu H. Hui (2006). CRC Press. ISBN 1-57444-551-0.

[2] Doijode, S. D. (2001). Seed storage of horticultural crops (pp 157). Haworth Press: ISBN 1-56022-901-2

[3] A Comparative Genetic Linkage Map of Eggplant (Solanum melongena) and Its Implications for Genome Evolution in the Solanaceae Sami Doganlar, Anne Frary, Marie-Christine Daunay, Richard N. Lester, Steven D. Tanksley, GENETICS August 1, 2002 vol. 161 no. 4 1697-1711

[4] Antioxidant activity of nasunin, an anthocyanin in eggplant peels. Noda Y, Kneyuki T, Igarashi K, Mori A and Packer L, Toxicology, 7 Aug 2000, volume 148, issues 2-3, pages 119-123, PubMed, doi:10.1016/S0300-483X(00)00202-X

[5] Erdogan A, Rao SS (April 2015). "Small intestinal fungal overgrowth". Curr Gastroenterol Rep 17 (4): 16. doi:10.1007/s11894-015-0436-2. PMID 25786900

[6] Martins N, Ferreira IC, Barros L, Silva S, Henriques M (June 2014). "Candidiasis: predisposing factors, prevention, diagnosis and alternative treatment".Mycopathologia 177 (5-6): 223–240. doi:10.1007/s11046-014-9749-1.PMID 24789109

[7] Tortora, Gerald, J. (2010). Mibrobiology:an Introduction. San Francisco, CA: Pearson Benjamin Cummings. p. 758

[8] Zadik Yehuda; Burnstein Saar; Derazne Estella; Sandler Vadim; Ianculovici Clariel; Halperin Tamar (March 2010). "Colonization of Candida: prevalence among tongue-pierced and non-pierced immunocompetent adults". Oral Dis 16 (2): 172–5. doi:10.1111/j.1601-0825.2009.01618.x. PMID 19732353.

[9] Ryan KJ, Ray CG (editors) (2004). Sherris Medical Microbiology (4th ed.). McGraw Hill.ISBN 0-8385-8529-9.

[10] Tortora, Gerald, J. (2010). Microbiology: an Introduction. San Francisco, CA: Pearson Benjamin Cummings. p. 759.

[11] K.R.Aneja (2003) Experiments in Microbiology Plant Pathology and Biotechnology (4th Edition) ISBN 81-224-1494-X

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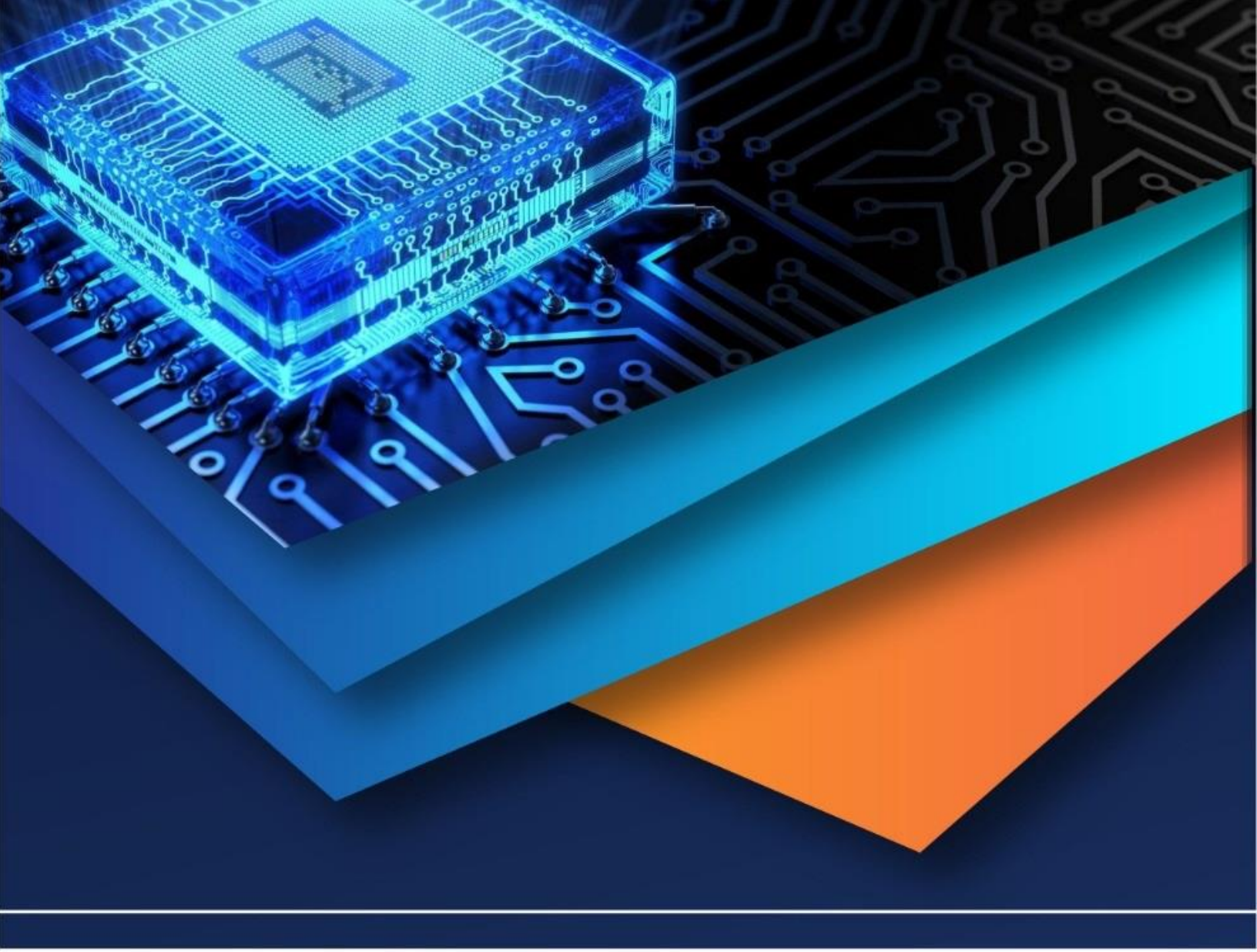

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