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Research Article

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Antimycotic Properties of Some Antidiabetic Medicinal Plants Against *Absidia blakesleeana* (A Causative Agent of Mucormycosis: The Black Fungus)

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Abstract

In the present study, antidiabetic medicinal plants were screened for antifungal activity against *Absidia blakesleeana,* a fungus causing mucormycosis (the black fungus). Antidiabetic plants extracts such *Ficus religiosa, Catharanthus roseus, Ocimum tenuiflorum, Terminalia arjuna, Morus alba,* and *Syzygium cumini* were used by using disc diffusion method. Fluconazole antibiotic was used as positive control. The qualitative phytochemical compounds such as tannin, saponin, flavonoids, and alkaloids were analyzed. Zone of inhibition was checked and the plant which shows maximum zone of inhibition in taken further for the activity. *F. religiosa* shows maximum zone of inhibition of 32.5 mm followed by *M. alba* (20.5 mm) then *C. roseus* (20 mm) then *O. tenuiflorum* (20 mm) then *S. cumini* (19.5 mm) and the minimum zone of inhibition was shown by the plant *T. arjuna* (14 mm). The qualitative phytochemical compounds such as tannin, saponin, flavonoids, and alkaloids were analyzed in the above mentioned 6 plant extracts. Plants such as *O. tenuiflorum* and *T. arjuna* showed the presence of tannin, carbohydrates, saponin, alkaloids, and flavonoids as phytochemical compounds. No phenol and protein were observed in any tested plant aqueous extracts. It can be suggested from the present study that the plant extracts may be used as an alternative to commercially available antibiotics after *in vivo* study.

Keywords

Antimycotic, Medicinal, Plants, Black fungus, COVID-19, Mucormycosis, SARS-CoV-2

Introduction

Mucormycosis is a very serious, rare, and dangerous fungal infection. Mucormycetes is a group of mold species, which affects the lungs, skin, and intestine. Mucormycosis is also known as the "black fungus." Mucormycosis is an emerging angioinvasive infection caused by the ubiquitous filamentous fungi of the Mucorales order of the class of Zygomycetes. The mucormycetes mold is most common in manure, rotting wood, leaves, soil, and other organic matter. The most frequent causes of the disease are members of the Mucoraceae family, including *Rhizopus arrhizus, Rhizopus pusillus, Apophysomyces elegans, Absidia elegans,* and *Mucor racemosus.* Mucormycosis is caused by *Rhizopus* spp., and *Mucor* spp. [1].

A significant rise in mucormycosis cases was seen during the COVID-19 pandemic [2-3]. The majority of cases of COVID-19-associated mucormycosis were reported in India which was related with the Delta variant (B.1.617.2). The most frequently recognized risk factor of developing mucormycosis is diabetes mellitus [2]. The clinical representation of mucormycosis is rhino-orbital-cere-

bral, pulmonary, gastrointestinal, cutaneous, and disseminated [3-4]. Despite extensive use of medical and surgical procedures no effective treatment was top up [2].

The genus *Absidia,* a filamentous fungi found everywhere in soil and dead vegetation inhabiting different growth temperature optima ranging from 20 - 42 call across the world. They are members of the Zygomycetes class. Another name of *Absidia* is *Lichtheimia corymbifera*. There are 12 to 21 named species of *Absidia*, depending on the taxonomy. *Absidia corymbifera*, also named *Absidia ramosa* or *Mycocladus corymbiferus.* This species was found in the indoor environment and is linked to many adverse health effects. Some of the other important *Absidia* species are *A. coerulea*, *A. cylindrospora, A. glauca,* and *A. spinosa*. *A. corymbifera* is the sole pathogenic species in humans of the genus *Absidia*. Patients with diabetic ketoacidosis disease is susceptible to the fulminant and typically fatal infection known as mucormycosis (zygomycosis), which is caused by fungi of the genera *Rhizopus*, *Mucor*, and *Absidia*. These fungal infections are opportunistic infections and are typically not aggressive or harmful to humans. The fulminant severity of the illness in the diabetic ketoacidosis patient raises the possibility of a significant flaw or loss in a crucial host defense mechanism [5].

In addition to diabetes, kidney failure, organ transplants, long-term corticosteroids and immunosuppressive therapy, cirrhosis, burns, and AIDS malignancies like lymphomas and leukemias, mucormycosis is an invasive, aggressive, fulminant, and fulminant fungal infection that can be precipitated by various factors. The risk of contracting COVID-19 infection is higher in diabetic people. It was noted that some viruses may become more virulent as a result of excessively high blood glucose levels, a symptom of diabetes mellitus. There are two types of diabetes type-1 and type-2. Type-1 needs insulin to control glucose in blood. It mainly occurs in children. Diabetes type 2 patients do not show heightened sensitivity to SARS-CoV-2 infection. However, with a sharp increase in mortality, they had more than double the chance of COVID-19-related hospitalization and critical care admission [6].

Guan et al. [7] found that 16.2% of patients with severe SARS-CoV-2 symptoms had diabetes. Circulating C-reactive protein (CRP) levels, lymphocyte counts, and neutrophils counts have all been shown in an increasing number of clinical investigations to be significantly correlated with the severity of COVID-19. Results showed that patients with diabetes who also had a SARS-CoV-2 infection had significantly higher CRP levels and neutrophils counts. Nevertheless, there was no discernible distinction in lymphocyte counts between covid-19 participants with and without diabetes. The associations between diabetes and covid-19 severity were also significantly impacted by lymphocyte count and CRP adjustments. To examine the specifics of the inflammation caused by SARS-CoV-2 infections in people with diabetes more studies are required. Mucormycosis resistance poses a significant threat to antifungal therapeutics, so understanding its molecular mechanisms is critical to developing new and effective antifungal mechanisms [8].

Mucor spp. are found widespread in nature, including soil, air, and raw materials or foodstuffs. To date, various *Mucor* spp. have been isolated from various foods. In the food industry, *Mucor* spp. display an ambivalent behavior. On the one hand, *Mucor* spp. are used as an adjunct technological organism to obtain the desired qualities of a final product, such as cheeses [9]. Five important *Mucor* spp. are regarded to be related to food spoilage (*M. circinelloides*, *M. hiemalis, M. piriformis, M. plumbeus*, and *M. racemosus*) [10-11]. *M. circinelloides* have been isolated from yogurts, which were the presumed causal organism for illness in >200 consumers [12]. The increase of immunocompromised cohorts has seen a higher rate of mucormycosis and ca. 15% of patients suffering severe neutropenia developed mucormycosis, with mortality from 68% to 100% [12, 13]. Paterson and Lima [14] reported human pathogenic fungi of *Aspergillus, Fusarium,* and *Mucor* species from various food samples such as baked goods, beans, beverages, chocolate, cereals, dairy, margarine, fruit, meat, eggs, fish, nuts, and seeds.

It is well known that mucoraceous fungi are resistant to most antifungals, including voriconazole *in vitro.* There are some isolated cunninghamella and apophysomyces that are resistant to amphotericin B, but the drug is most effective in treating them [15]. The use of natural preservatives and antimicrobials to replace synthetics is preferable and may be of great interest to the food and pharma industries. Consumers are increasingly demanding for low levels of synthetic antimicrobial and preservatives in food; and yet there is also an increasing demand for wholesome and safe drugs with a long shelf life [16].

Today, using medicinal plants to treat disorders like diabetes is advised because they include numerous phytoconstituents such flavonoids, terpenoids, saponins, carotenoids, alkaloids, and glycosides that may have antidiabetic and antimicrobial properties. The combined action of biologically active substances (i.e., polyphenols, carotenoids, lignans, coumarins, glucosinolates, etc.) leads to the potentially advantageous properties of each plant matrix. Keeping in view the above justification some antidiabetic plant extracts were evaluated for their antimycotic activity against *A. blakesleeana,* a causative agent of mucormycosis, the black fungus.

Materials and Methods

Procurement of fungus

A. blakesleeana fungus culture was procured from Kurukshetra University, Kurukshetra, Haryana, India. The fungus culture was maintained in potato dextrose agar (PDA) slants. Fungal culture was identified by cultural and microscopic characteristics. For preservation, the fungal culture was maintained at 4 ˚C in PDA slants.

Collection of plant materials

Plants were collected from Village Mehre, Hamirpur, Himachal Pradesh, India. The details of plants such as common, botanical, family names, part used and their properties (Table 1).

Extraction of plants extract

The extraction of plants was done by decoction method.

Table 1: Antidiabetic plants used and their applications.

Common name	Botanical name	Family	Part used	Applications
Peepal	*F. religiosa*	Moraceae	Leaves	Antidiabetic, anti-inflammatory, antioxidant
Sadabhar	*C. roseus*	Apocynacea	Leaves	Reduce inflammation, anticancerous, antidiabetic
Tulsi	*O. tenuiflorum*	Lamiaceae	Leaves	Antioxidant, antifungal, antidiabetic
Mulberry	*M. alba*	Moraceae	Leaves	Anticancerous, healing, antidiabetic, antimetabolic
Arjun	*T. arjuna*	Combretacea	Bark	Maintain cholesterol level, balanced blood level
Jamun	*S. cumini*	Myrtaceae	Seeds	Antioxidant, reduce glycosuria, regulate blood sugar level

Weighing 2 gm of fresh leaves of all plants and then took 50 ml of distilled water. Then added leaves into distilled water after that boiled it and then filtered. The extract placed over night at room temperature and tested for antifungal activity.

Antimycotic activity of selected plants

Antimycotic studies of leaf extracts of medicinal plants were tested by using disc diffusion. Discs of filter paper with a diameter of 6 mm were soaked in 1 ml of extract. *Absidia* culture was placed onto PDA plates using a point inoculation technique. The plates incubated at 28 ˚C for fungal growth. After 3 - 5 days of incubation, the diameter of the zone of inhibition was measured to determine the antimycotic activity [17].

Phytochemical analysis of antidiabetic plants

The qualitative phytochemical analysis of leaf, seed, and bark extracts to detect the presence of different secondary metabolites such as alkaloids, flavonoids, proteins, saponin, carbohydrates, and tannin was done. The quantitative phytochemical analysis of leaf, seed, and bark extracts to detect the quantity of flavonoid and alkaloid.

Qualitative phytochemical analysis

Detection of tannin

The presence and absence of tannin was detected by Ferric test. Take 200 µl sample added in 5 ml distilled tube and then boiled after that filter them with filter paper. 1 ml of filtrate was added in tubes. 3 to 4 drops of (0.1%) of ferric chloride was added in 1 ml of filtrate. A greenish, blue, or blackish color appears when tannin is present.

Detection of proteins (Biuret test)

Prepare 0.5% sodium hydroxide and 0.5% copper sulfate solution in distilled water. Take one test tube as a control and add 1 ml distilled water and 2 - 3 flakes of bovine serum albumin protein. Sodium hydroxide and copper sulfate were added to bovine serum albumin protein. Sodium hydroxide and copper sulfate were added in 1 ml of each extract test tube and kept test tubes for 4 - 5 min. The color appeared bluish violet showing the presence of protein.

Detection of carbohydrates (Benedict's test)

Take one test tube of control added 1 ml distilled water then added 0.5 g of glucose mix them. After mixing add 1 ml of Fehling solution then boil at 70 - 80 ˚C. 200 µl sample and 1 ml of distilled was added in 6 six test tube each mix them. Put 1 ml of Fehling solution in each test tube. Boil them at the same temperature. In result if the brick red color is appeared then it shows presence of carbohydrates.

Detection of saponin (Foam test)

Take 6 test tubes added 100 µl of sample and 3 ml distilled water in each tube then boiled it. Filtration was done by filter paper and filtrate is obtained. Distilled water of the same quantity of filtrate was added. For 10 sec shake the filtrate and 12 sec to stable. If the foam appeared on surface of tube, it means saponin was present.

Detection of flavonoids (Alkaline reagent test)

100 µl samples were added in each 6 tubes then add 6 ml of 1% aluminum chloride. If yellow appears, then the next step is performed. 2 ml of aluminum chloride was added to each sample. After that drop-by-drop sulfuric acid is added. As a result, the colorless appearance showed presence of flavonoids [18].

Detection of alkaloids (Wagner's reagent test)

100 µl from sample was taken in test tubes. Add 4 ml of 1% hydrochloride acid then heat the sample in hot plate at 70 ˚C. Filter the samples and shake them properly. 1 ml of each filtrate was taken in tubes put 5 - 6 drops of Wagnar reagent in it. The color obtained was radish brown representing the presence of alkaloids [19].

Quantitative phytochemical analysis

Quantification of flavonoids

The quantitative determination of flavonoids was conducted by using methanol [20]. Take 1 ml of each sample in 6 test tubes. Make 30 ml of 80% aqueous methanol. Then take 5 ml of methanol in each test tube. After that vortex them 3 times for 2 - 3 min each. By using filter paper collect the filtrate in crucible and place the crucible in oven at 105 ˚C. The crucible and its contents were placed in desiccators for cooling and weighing until constant weight was obtained.

Quantification of alkaloids

The quantitative determination of alkaloids was done by Harborne [21]. Take 1 ml of each sample in beakers. Made 10% glacial acetic acid in 10 ml methanol which means 1 ml glacial acetic acid and 9 ml methanol was added in each beaker of samples. Shake the samples for 30 min each. After shaking, put the beakers on the water bath for 15 min. After 15 min, filter them and add 2 ml ammonia solution and 2 ml distilled

water on the filter paper. Then filter paper was placed on air dry after dry weighing the filter paper which means the precipitates weight is obtained. Then check the pre- and post-weight of the filter paper.

Quantification of tannin

Take 1 test tube as a blank add 5 ml distilled water and 2 ml tannic acid reagent. Take 0.5 ml of each sample in 6 test tubes 4.5 ml of distilled water and 2 ml tannic acid reagent is added in each test tube. Determine the absorbance reading of each sample at 605 nm by using a spectrophotometer [22]. Test samples were run along with standard tannic acid (100 mg/ml) in water and the absorbance read at 605 nm.

Quantification of carbohydrates

Take 1 test tube as blank add 3 ml of distilled water and 2 ml 3,5-dinitrosalicylic acid (DNS) reagent. Take another 3 test tubes, one is standard, second is sample 1 (jamum), third is sample 2 (tulsi). In standard test tube added 2.5 ml distilled water and 500 µl glucose and 2 ml DNS. In sample 1 and 2 added 2.5 ml distilled water, 500 µl of sample and 2 ml DNS reagent. Heat all the test tubes at 55 °C on water bath, red brown color appeared. Take the tubes and cool to room temperature. Read extinction at 540 mm against all the test samples.

Quantification of saponin

1 ml of each sample added in 120 ml of 20% aqueous methanol. Boil the samples at 55 °C over a hot water bath for 4 h and fitter them. Transfer the filter into plant tissue culture (PTC) tubes added 5 ml of diethyl ether in each PTC tubes. Shake them for 5 min. Two layers appeared discard ether layer from top. Then add 5 ml butanol in each PTC tubes. Shake them properly and remove the upper layer. Made 5% sodium chloride in 30 ml. Added 5 ml sodium chloride in each tubes shake properly. Transfer the upper layer into crucible to heat in oven at 150 °C. Take proper readings after 30 min. From the concentrated standard solution, dilutions (0 - 0.4 mg/ml) were made with the same solvent. 1 ml of the reagent was added to each of these solutions, and after 30 min, the absorbance was measured.

Results

Antifungal activity of plant extract against *A. blakesleeana*

A total of 6 extracts of 6 plants were made (*F. religiosa* (peepal), *C. roseus* (sadabhar), *O. tenuiflorum* (tulsi), *M. alba* (mulberry), *T. arjuna* (arjun tree), and *S. cumini* (jamun)) for their antifungal activity by disc diffusion method. Her method nazole antibiotic were used as positive control.

F. religiosa (peepal)

The aqueous leaves extract of *Ficus* spp. was effective against *Absidia* fungus with inhibition zone of 32.5 mm.

C. roseus (sadabhar)

The aqueous leaves extract of *Catharanthus* spp. also showed effectiveness against *Absidia* fungi with minimum inhibition zone of 20 mm.

O. tenuiflorum (tulsi)

The aqueous leaves extract of *Ocimum* spp. showed minimum activity against fungus with inhibition zone of 20 mm.

T. Arjuna (Arjun tree bark)

The aqueous bark extract of *Terminalia* spp. was shown to be effective against *Absidia* with minimum inhibition zone of 14 mm.

S. cumini (jamun)

The aqueous seed extract of jamun showed activity against fungus with minimum inhibition zone of 19.2 mm. The aqueous leaves extract of mulberry leaves was showed activity against *Absidia* with minimum zone inhibition of 20.5 mm.

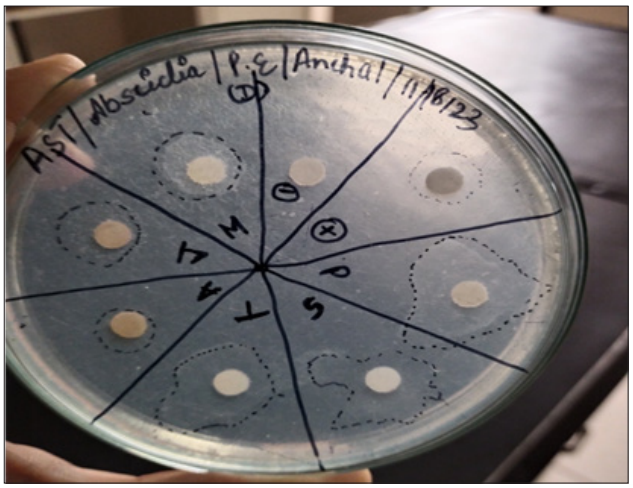

Figure 1: Antifungal activity of antidiabetic aqueous plant extracts against *A. blakesleeana* culture (zone of inhibition was observed in mm).

Table 2: Antimycotic activity of antidiabetic medicinal plants against *A. blakesleeana.*

S. No.	Aqueous plant extracts	Zone of inhibition
1	*F. religiosa* (peepal)	32.5 mm
2	*C. roseus* (sadabhar)	20 mm
3	*O. tenuiflorum* (tulsi)	20 mm
4	*T. arjuna(arjun tree)*	14 mm
5	*S. cumini (jamun)*	19.5 mm
6	*M. alba (mulberry)*	20.5 mm

The antifungal activity against *Absidia* with minimum zone inhibition of 28 mm. Antifungal activity of various plants were observed *F. religiosa* showed maximum antimycotic activity (32.5 mm) followed by *M. alba* (20.5 mm), *C. roseus* and *O. tenuiflorum* (20 mm), *S. cumini* (19.5 mm) and minimum in *T. arjuna* (14 mm). The result is shown in figure 1 and table 2.

Phytochemical analysis of antidiabetic plants extracts

The qualitative phytochemical analysis of 6 plants extracts was observed during the present study. Phytochemical compounds such as tannin, saponin, flavonoids and alkaloids were observed in all the tested plants extracts. In *O. tenuiflorum* and *T. arjuna* it showed the presence of tannin, carbohydrates, saponin, alkaloids, and flavonoids as phytochemical compounds.

Carbohydrate showed the presence only in *O. tenuiflorum*, *S. cumini* and absent in other tested plant extracts. No phenol and protein were observed in any tested plant aqueous extracts. This may be due to the concentration being too little to be observed or the used method is not sensitive enough to detect the trace amount of protein. The results are shown in figure 2 and table 3.

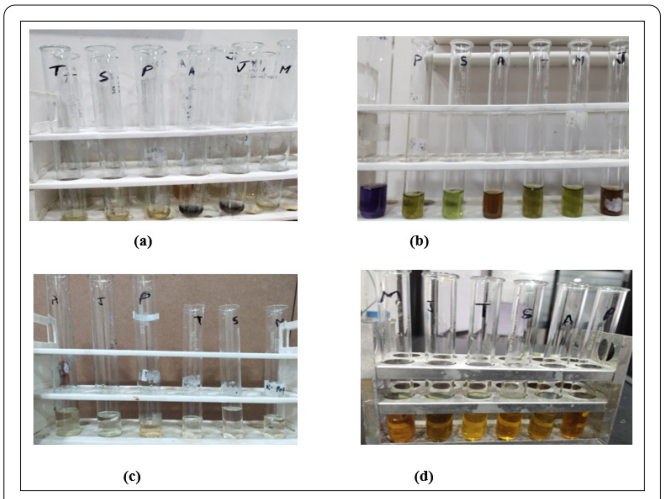

Figure 2: Qualitative analysis of plants extract showed presence of **(a)** tannin, **(b)** proteins, **(c)** flavonoids, and **(d)** alkaloids.

Quantitative analysis of tested plant extracts

Quantification estimation of flavonoid

The quantity of flavonoid is maximum in *C. roseus, S. cumini* and *O. Tenuiflorum,* and minimum in *M. alba* and very less quantity of flavonoid is present in *F. religiosa* and *T. arjuna* as shown in table 4. The maximum amount of alkaloids precipitates presents in the *F. religious, O. tenuiflorum* and *S. cumini*. The minimum number of alkaloids was present in the *C. roseus* and *T. arjuna* as shown in table 4 and table 5. The maximum amount of tannin is present in *T. arjuna* and *S. cumini* and minimum amount in *M. alba, F. religiosa* and *C. roseus* (Table 6).

Quantitative estimation of carbohydrates

The quantitative test of carbohydrates only for *O. tenui-*

Table 6: Quantitative analysis of tannin compound present in the selected plants.

Plant samples	Readings in spectrophotometer (absorption at 605 nm)
Blank	0.0
F. religiosa	0.397
C. roseus	0.328
O. tenuiflorum	0.243
M. Alba	0.650
T. arjuna	1.560
S. cumini	1.755

Table 3: Qualitative phytochemical analysis of antidiabetic medicinal plants extract.

Test	*F. religiosa* (peepal)	*C. roseus* (sdabhar)	*O. tenuiflorum* (tulsi)	*T. arjuna* (arjun)	*M. alba* (mulberry)	*S. cumini* (jamun)
Test for tannin	+	+	+	+++	+	+++
Test for carbohydrates	-	-	++	-	-	++
Test for proteins	-	-	-	-	-	-
Test for saponin	+	+	+	+++	++	++
Test for flavonoids	+	+++	++	+	++	+++
Test for alkaloids	++	+	++	+	++	++

Table 4: Quantitative analysis of flavonoid compound present in the selected plants.

Plants name	Pre empty weight (g) (crucible)	Pre weight (g) (crucible + sample)	Post oven 1st reading (g)	Post oven 2nd reading (g)	Post oven 3rd reading (g)
F. religiosa	1.42	2.10	12.79	12.74	12.74
C. roseus	1.47	2.20	17.20	17.18	17.18
O. tenuiflorum	1.09	1.77	16.51	16.50	16.50
T. arjuna	1.01	1.67	11.79	11.78	11.78
M. alba	1.18	1.9	13.87	13.87	13.87
S. cumini	1.55	2.30	18.11	18.10	18.10

Table 5: Qualitative analysis of alkaloid compound present in the selected plants.

Plants sample	Pre weight (g) (filter paper)	Post weight (g) (filtrate alkaloids)	Precipitates weight (g) (post weight - pre weight)
F. religiosa	0.779	0.920	0.141
C. roseus	0.490	0.527	0.037
O. tenuiflorum	0.386	0.430	0.44
T. arjuna	0.589	0.621	0.032
M. alba	0.490	0.566	0.076
S. cumini	0.586	0.683	0.097

Table 7: Quantitative estimation of carbohydrates.

Test sample	Absorbance (540 nm)
Blank	0.0
Standard	1.681
O. tenuiflorum	1.472
S. cumini	2.875

florum and *S. cumini* because all other plants do not show presence of carbohydrates. Maximum amount of carbohydrate presents in *S. cumini* and minimum in *O. tenuiflorum* as compared to standard sample as shown in table 7.

Quantitative estimation of saponin

The quantity of saponin is maximum in *T. arjuna, M. alba,* and *S. cumini*. Minimum amount of saponin is present in *F. religious, C. roseus,* and *O. tenuiflorum* as shown in table 8.

Discussion

In the present study *Absidia* fungus culture was used as test organism. The antifungal activity of various plants extracts such as *F. religiosa, C. roseus, O. Tenuiflorum, T. arjuna, M. alba,* and *S. cumini* were observed.

According to Al-Fatimi [22] root bark of *Euclea divinorum* Hiern (Ebenaceae) is traditionally used to treat diseases of the mouth, teeth, skin, and blood. Six pathogenic fungi that cause human illness are studied for the first time with the help of plant root barks. It was found that *E. divinorum* root bark had higher antifungal activity against *A. corymbifera, Aspergillus fumigatus, Candida krusei, Microsporum gypseum, Mucor* spp., *and Trichophyton mentagrophytes* than the common antibiotic nystatin.

According to Jangid and Begum [17] *C. roseus, Lantana camara, Nerium indicum, Sida cordifolia, and Ziziphus mauritiana* leaf extracts were tested for their antimycotic effectiveness against *M. circinelloides*. The black fungus, or mucormycosis, is brought on by this fungus species. Patients with covid are currently affected by mucormycosis as a result of extended steroid treatment. In order to cure mucormycosis, it is necessary to produce antimycotic drugs that are more potent and less harmful. Infectious disease treatments have historically used both plants and the preparations made from their extraction. Leaf extracts in water, ethanol, and dimethyl sulfoxide solutions were utilized in this study to test for antimycotic efficacy. Significant activity was seen against *M. circinelloides* in all leaf extracts of the chosen medicinal herbs. The strongest antimycotic activity was demonstrated by the ethanol leaf extract of *C. roseus*, which was followed by *N. indicum* and *L. camara. Z. mauritiana,* which showed moderate activity against *M. circinelloides*. The strongest antimycotic activity was demonstrated by the ethanol leaf extracts of *C. roseus and N. indicum*, with zones of inhibition of 23 mm and 22 mm, respectively. Maximum activity was demonstrated by the aqueous leaf extracts of *N. indicum* and *C. roseus* against *M. circinelloides* (20 mm and 19 mm, respectively). Except for *Z. mauritiana*, all of the chosen plants' dimethyl sulfoxide extracts had good antimycotic efficacy. The fruits of *S. cumini* are rich in raffinose, glucose, fructose [19]. Since amphotericin B was extensively used for treatment, but if it fails then combination of posaconazole and caspofungin was found to be effective due to potential synergistic effects. More reliable and efficient drug therapy is very much necessary to deal with this kind of complex disease [23]. Mezni et al. [24] studied the oil derived from *Quercus suber* L. mature acorns that were collected from three distinct Tunisian locations. *Escherichia coli, Bacillus subtilis, Candida albicans,* were used to assess the oil's antimicrobial properties. For bacteria and fungus, gentamicin and amphotericin B were utilized as positive references, respectively.

Conclusion

In the present study, *A. blakesleeana* fungus was controlled by antidiabetic medicinal plants, *F. religiosa, C. roseus, O. Tenuiflorum, T. arjuna, M. alba,* and *S. cumini* by disc diffusion method. *F. religiosa* showed maximum antimycotic activity with zone of inhibition of 32.5 mm followed by *Morus* spp. (20.5 mm), *Catharanthus* spp. and *Ocimum* spp. (20 mm), *Syzgium* spp. (19.5 mm) and minimum zone of inhibition in *Terminalia* spp. (14 mm).

The secondary metabolites of qualitative phytochemical compounds such as tannin, saponin, flavonoids, and alkaloids were observed in all the tested plants extracts. *Ocimum* spp. and *Terminalia* spp. showed the presence of tannin, carbohydrates, saponin, alkaloids, and flavonoid. The present findings suggest that the structural level identification of active compounds and their *in vivo* study needs to be done in future before using the tested plant extracts as an alternative to commercially available antibiotics.

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Conflict of Interest

None.

Table 8: Quantitative analysis of saponin present in the plant samples.

Plant sample	Pre weight reading (crucible) (g)	1st reading (g)	2nd reading (g)	3rd reading (g)
F. religiosa	16.11	16.73	16.64	16.63
O. tenuiflorum	13.88	14.24	14.22	14.21
C. roseus	16.96	17.59	17.38	17.36
T. arjuna	11.50	12.08	12.08	12.07
S. cumini	17.71	18.33	18.25	18.25
M. alba	13.55	14.10	14.06	14.06

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