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DIAGNOSING FUNGI FOUND ON BATHROOM DOOR HANDLES AND ON SINKS AND ITS IMMUNE EFFECTS

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Abstract

In this study, samples were collected from a group of bathrooms including bathrooms of the College of Science/Department of Life Sciences for female students and home bathrooms in Thi Qar Governorate during the period from March 1 to April 1. The results showed the presence of the following fungi *Penicillium* 87.5%, *Aspergillus*: 37.5%, *Candida*: 50%, *Cladosporium:* 25% , *Aspergillus fumigatus, Zygomycetes, Rhizopus* and *Rhodotorula* (orange yeast): 12.5%

Immunological effects of Aspergillus infection, Weakening of the cellular immune response: Aspergillus infection leads to inhibition of the functions of T cells and natural killer cells, which weakens cellular immunity. Increased inflammation: Aspergillus stimulates excessive inflammatory responses by activating immune cells, which can lead to tissue damage and autoimmune diseases.. Increased risk of other fungal infections: Aspergillus infection increases susceptibility to other fungal infections due to weakened immunity. Effect on allergies: In some cases, exposure to Aspergillus can lead to the development of allergic sensitization. Therefore, common fungi in bathrooms such as Aspergillus and Candida can negatively affect the immune response and increase the risk of infections and other fungal infections. These effects should be handled carefully.

Keywords: Bathroom, Fungi ,immunity, Isolated, *Penicillium*

Introduction

Fungi are eukaryotic heterotrophs, that extensively include species of moulds, yeasts and mould . It is possible for them to be single-celled (like yeasts) or multicellular (like molds), and they may also be categorized as spore-forming biotrophs, saprotrophs, or necrotrophs. Fungi are a class of eukaryotic heterotrophs that includes a wide variety of mold, yeast, and mushroom species. In addition to being single-celled (like yeasts) or multicellular (like molds), they can also be categorized as spore-forming biotrophs, saprotrophs, or necrotrophs. [1] Given the high humidity and temperature that foster fungal growth over extended periods of time, toilets are strongly suspected of being a source of mycosis transmission [2] Aspergillus and Penicillium, two common pathogenic fungus that grow in toilets, are typically found as like saprophytes. Few species are thought to have a significant role in animal or human illness. But a lot of organisms that are normally innocuous are excellent opportunists and are becoming discovered to infiltrate immunocompromised individuals . [3]

Penicillium marneffei is one of the varieties of penicillium; in some regions of Southeast Asia, penicilliosis marneffei ranks third among opportunistic infections among HIV-positive

individuals. Penicillium marneffei is native to southern China and Southeast Asia. Reports of cases have come from both Western and Eastern nations. Based on 155 instances of the infection, this study addresses the mycology, history, clinical symptoms, diagnosis, and management of penicilliosis marneffei. Approximately 80% of patients have impaired immune systems. P. marneffei can infect the skin, liver, and lungs, among other organs. The most typical clinical manifestations include anemia, weight loss, and fever. Most frequently, the organism has been isolated from bone marrow, blood, and skin. Fungal isolates identified immunologically Immunohistochemical techniques and exoantigen testing can be used. Parenteral amphotericin Band itraconazole is a generally safe and efficient treatment for HIV-positive patients' disseminated penicilliosis marneffei . [4]

resistance to fungus

The clinical forms of the disease are dependent on the patient's immune response because it is well recognized that host defense mechanisms affect the appearance and severity of fungal infections. For instance, the host immune system plays a significant role in determining which specific disease form develops following exposure to the common organism Aspergillus fumigatus8 or whether Candida albicans infection or commensalism progresses9,10. The host defence mechanisms against fungi are numerous, and range from protective mechanisms that were present early in the evolution of multicellular organisms ('innate immunity') to sophisticated adaptive mechanisms, which are specifically induced during infection and disease ('adaptive immunity'). The T HELPER 1 (TH1)/TH2 dichotomy has given insight on the basic idea that various effector functions are necessary to eradicate many fungal infections .[11,12,13, and 14].

In the current context, fungal infections in household and health environments are a growing concern. These fungi usually grow in damp and dark areas, such as bathrooms, as these environments provide ideal conditions for their growth [5]. Previous research has shown that some of these fungi, such as Aspergillus and Candida, have negative effects on the immune system [6.12].

In this study, a group of fungi were isolated and identified from samples collected from bathrooms in the College of Science/Department of Life Sciences for women and home bathrooms in Thi Qar Governorate during the period from March 1 to April 1 [3]. These results were also combined with the previous conclusion on the immune effects associated with Aspergillus infection [7.13].

.**Objectives of the study**

The current study aimed to:

1- Isolate fungi present in bathrooms in different places in Dhi Qar Governorate.

2- Diagnosing isolated fungi and determining the importance and danger of their presence in isolated places

Previous studies

Surprisingly few studies exist.In 1987, Nishimura claimed that a fungus infection had been found in the restroom.He studied the development properties of many genus species of molds (Nishimura K, Miyaji M, Taguchi H, Tanaka R. etc.). Bathroom drainpipe sludge and bathwater fungus. Mycopathologia 1987; 97:17–23[7] Moriyama made use of the bathroom wall in 1992.examined the fauna of floating molds, such as Cladosporium, Phoma,According

to a report (Moriyama Y, Nawata N, Tsuda T, Nitta M. Occurrence of moulds in Japanese bathrooms. International Biodeterioration and Biodegradation 1992; 30: 47-55), there are a lot of Alternaria and Penicillium.[8]

In 1999, Hamada conducted a survey on fungal contamination in ordinary houses' bathrooms using a swab kit. They include Cladosporium, Exophiala, Aureobasidium, Phomba, and others that are prevalent in both the summer and the winter. Exophiala has been shown to be prominent in the bathroom's bottom area. Additionally, it is evident that Exophiala has contaminated the mold.

on soap containers, etc [9]

In 2004, Hamada was discovered in the female dorm facilities at the University of Benin in Benin City. The frequency and degree of mold and yeast contamination in restrooms that are higher The amount of detergent and disinfectant that is needed to clean bathroom floors is far more than that of washing their top surfaces. restrooms, which explains why fungus has grown across these restroom walls. The prevalence of fungal growth in a highly crowded area (a school) prompted an investigation of the toilet walls.The residents of the bottom level noticed consistently that visitors frequently used the restroom, urinating on the ground floor, which increased the microbiological loads in the bathroom due to the entry of uronto and foot wear. The earth the first floor had the lowest fungal count and the greatest fungal count. The fungal count (x104 cfu/cm2) varied from 6.40 ± 0.04 to 22.80 ± 0.30 before to bathroom washing, and from 0.00 ± 0.00 to 0.80 ± 0.02 following bathroom washing. Only after the restrooms were cleaned were fungus isolates of the species Mucor mucedo isolated and identified. Following bathroom cleaning, there was a notable decrease in the fungal loads during the first, second, and third weeks ($p = 0.049$, 0.030, and 0.048, respectively) in the hostel.(N. Hamada, 2004). Mud and mold infestation in washing water suspended dirt. [10]

Materials and methods

3.1.Study area:

Samples were collected from students' bathrooms at Dhi_Qar University, College of Science, and transferred to the Microbiology Laboratory in the College of Science.

3.2. Sample collection:

Sinks, knobs, and washroom doors were sampled using the aspirant swabbing technique. After gathering eighteen (18) samples, we brought them to the lab.

3.3 Media and material preparation and sterilization:

We made Sabouraud dextrose agar (4%) per the directions provided by the manufacturer. Test tubes and conical flasks, among other media and equipment, were autoclaved for 15 minutes at 121°C to disinfect them. Garamycin ampoule was added to the agar medium as a supplement. Petri plates were filled aseptically with sterile modified medium (Sabouraud dextrose, 4% agar supplemented with antibiotics), gently swirled, and allowed to cool.

3.4. media:

The medium Sabouraud Dextrozakar (4%) was used. The agar plates were placed in the incubator and incubated for 4–7 days at 37°C after the medium was prepared as per the manufacturer's instructions.

3.5 Dignosis:

Using the taxonomic keys of Professor Dr. Muhammad Hashim Al-Musawi of the College of

Science at Dhi Qar University, the cultured fungi were identified based on their cultural and morphological characteristics, such as the mycelium, spore type, and other fruiting bodies, through macroscopic and microscopic diagnosis. Through visual inspection, the cultivated fungus were recognized according to their morphological and cultural traits, including mycelia and spore type. Wet lactophenol blue cotton under an optical microscope's x40 objective lens
.

The Result

Isolation of Fungi:

Results and immune effects:

The results of the current study showed the presence of eight fungal species in the collected bathroom samples, including six fungal species and two fungi [1]. These fungi included:

1. Penicillium (Figure 1 and Figure 2)
2. Cladosporium (Figure 3 and Figure 4)
3. Aspergillus spp. (Figure 5 and Figure 6)
4. Rhodotorula (orange yeast) (Figure 7 and Figure 8)
5. Candida glabrata (Figure 9)

These fungi, especially Aspergillus and Candida, have negative effects on the immune system Weakening of the cellular immune response: Aspergillus infection leads to inhibition of the functions of T cells and natural killer cells. Increased inflammation: Fungi such as Aspergillus and Candida stimulate excessive inflammatory responses, which may lead to tissue damage and autoimmune diseases. Increased risk of other fungal infections: Infection with these fungi may increase susceptibility to other fungal infections due to weakened immunity. Effect on allergies: In some cases, exposure to some of these fungi may lead to the development of allergic sensitivity. Therefore, the presence of these common fungi in bathrooms may have serious health effects, requiring close monitoring and appropriate handling.

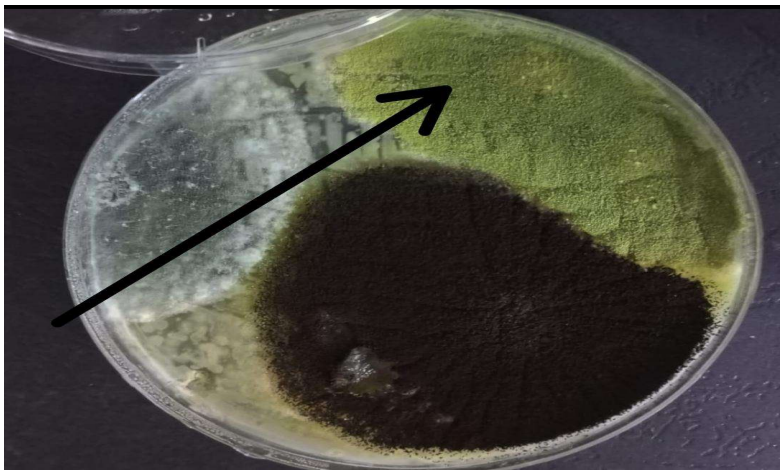

Figure 1 shows *Penicillium* grow in Sabouraud Dextrose 4% It was isolated from the bathroom of the College of Science, Dhi Qar University

Figure 2 : show Penicillium under microscope Powerful magnification 40x grow in Sabouraud
Dextrose 4%It was isolated from the
Qar University

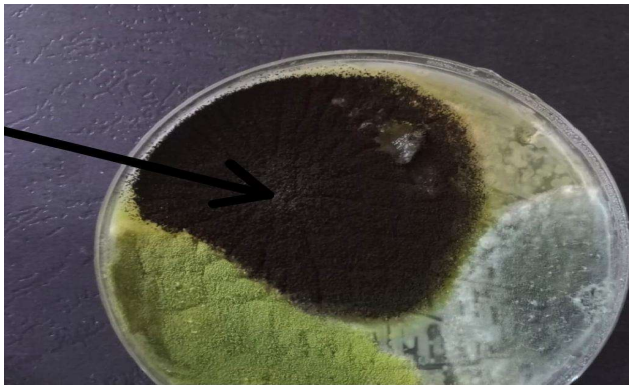

Figure 3 :cladosporium bathroom of the College of Science, Dhi Qar University grow in Sabouraud

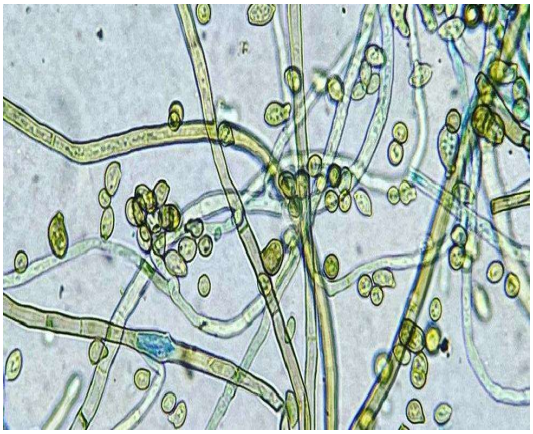

Figure 4: cladosporium undermicroscope
Powerful magnification 40x

Figure 5: *Aspergillus* spp. in Sabouraud
Dextrose 4%It was isolated
from bathroom of the College of Science

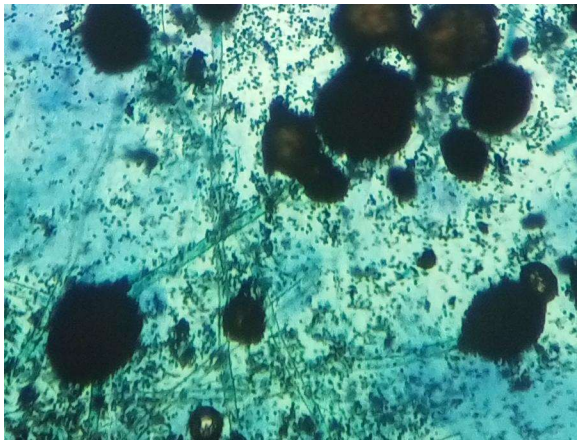

Figure 6: Aspergillus niger under microscope Powerful magnification 40x. isolated from the bathroom of

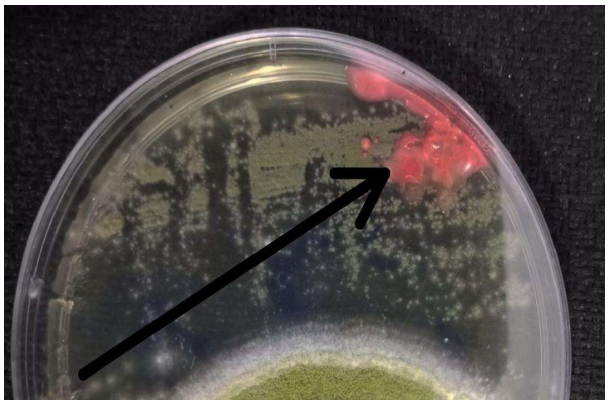

Figure 7: Orange yeast rhodotorul in Sabouraud Dextrose 4% It was the College of Science, thi Qar University

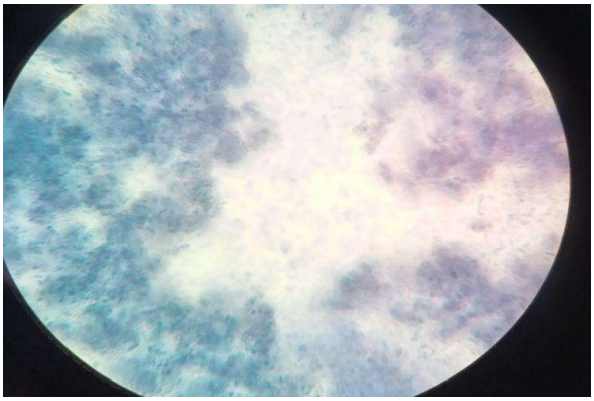

Figure 8:*Orange yeast Rhodotorula* under microscope Powerful magnification 40x.

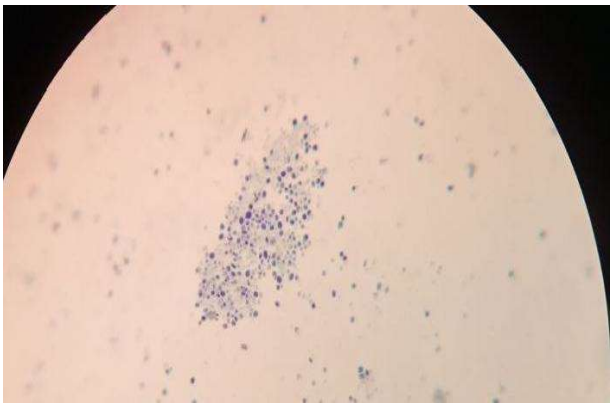

Figure 9: *Candida glabrata* under microscope Powerful magnification 40x It was isolated from the bathroom of th College of Science, Dhi Qar University

Table 1: fungal isolates from students' bathrooms

1.

2. No	3. Fungi	4. Type	5. Ratio of existence
6. 1	*7. Penicillium*	8. Mold	9. 87.5%
10. 2	*11. Aspergillus*	Mold	12. 37.5%
13. 3	*14. Aspergillus fumigatus*	Mold	15. 12.5%
16. 4	*17. Cladosporium*	Mold	18. 25%
19. 5	*20. Zygomycetes,*	Mold	21. 12.5%
22. 6	*23. Rhizopus*	Mold	24. 12.5%
25. 7	*26. Rhodotorula*	27. yeast	28. 12.5%
29. 8	*30. Candida*	31. yeast	32. 50%

33.

34.

35. The frequencies of fungi isolated from the bathrooms of Dhi Qar University's College of Science are displayed in Table 1. Penicillium had the highest frequency, estimated at 87.5%, with a frequency of seven times, followed by Candida, estimated at 50%, with a frequency of four times. We assessed the frequency of Aspergillus niger to be 37.5%, the frequency of Cladosporium to be 25%, and the frequency of Aspergillus fumigatus, Zygomycetes, Rhizopus, and Orange yeast rhodotorula to be 12.5%. Additionally, the data indicates if the fungus is yeast or mold. Penicillium, Aspergillus fumigatus, Aspergillus niger, Cladosporium, Zygomycetes, and Rhizopus are the six types of mold.

Discussion:

As we mentioned above, the most abundant molds were Penicillium spp. followed by Aspergillus spp. This is consistent with the researchers Leyla Benammar a, Taha Menasria a b, Amel Chergui a, Soumia Benfiala a, Ammar Ayachi c in 2015, and their research was similar to ours. But I disagreed with another researcher N. HAMADA ET AL in 2008, as the amount Penicillium spp. and Aspergillus spp. was zero when it was grown at a temperature of 37ºC [11] [12] bathroom are a highly frequented public place Especially since they are bathrooms for university students. Such closed, hot and humid places with poor sanitation may pose a serious risk factor by spreading fungal pathogens. The results of this study showed a high fungal load in the bathrooms studied, with varying differences between parts of the sample, and even a large diversity of fungal species, including human pathogens.

Among the results we found Aspergillus fumigatu is a fungus that causes diseases in humans. If your immune system is weakened by disease or medication, this fungus can make you very sickSamples that were examined showed a wide variety of fungus species, including human diseases, and varied variations among sample segments.

Aspergillus fumigatu is a fungus that causes illnesses in people, according to our findings. This fungus can make you really sick if you have a compromised immune system from a sickness or medicine.[14]

Recommendations

1. Intensifying studies on pathogenic fungi found in bathrooms
2. Personal care, such as washing hands with soap and water For 20 seconds after using the bathroom
3. When you're done washing your hands, dry them with a paper towel or tissue, instead of an air dryer.
4. Cleaners must use appropriate cleaning agents and methods to disinfect and disinfect surfaces and equipment
5. Be careful not to touch any contaminated surface or pick up things lying on the bathroom floor, and do not wash afterward
6. Do not use the phone in the bathroom. Bathrooms are considered an environment contaminated with fungi, bacteria, etc. When using the phone in the bathroom, the device may be exposed to contamination with these organisms.
7. "If you don't have to use a public bathroom, don't

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