

**Recovery of fungi from water in general
hospital of Diwaniyah city**

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Abstract:-

Water sources are known to harbor pathogenic molds. The prevalence of fungi was investigated in taps water samples in general hospital of Diwaniyah. To analyze the water a membrane filter method was used. Filamentous fungi were isolated from all samples taken, whereas yeasts were isolated from only 33.33% of samples. Prevailing species were *Aspergillus flavus*, isolated from 58.33%, *Aspergillus terreus*, from 50%, *Rhodotorula glutinis*, from 33.333% and *Aspergillus niger*, from 25% of the examined samples.

Introduction:-

Fungi are natural inhabitants of soil and water, and some species behave as opportunistic pathogens in man. Nosocomial opportunistic mold infections can be life-threatening in immunocompromised patients. The incidence of mold infections continues to rise despite the use of air filtration systems in hospitals ⁽¹⁾, suggesting that other hospital sources for molds may exist.

Reasons to investigate other sources of fungi in hospitals as that some species causing invasive disease in immunocompromised patients, are two-fold. Preventive measures that lower the concentration of airborne conidia by use of air filtration systems failed to reduce the risk of invasive fungal infections to zero, and gave rise to suspicion of other sources and routes of transmission. The second reason is the lack of genetic relatedness between environmental hospital strains and those causing invasive disease ⁽²⁾.

Water systems worldwide have been shown to be colonized with pathogenic molds ⁽³⁻⁵⁾ and there are several published articles in which water system was implicated as a possible source of nosocomial infections ⁽⁶⁻⁸⁾.

In this study the aim was to determine fungal population in samples collected from taps water of Diwaniyah general hospital.

Materials and Methods:-

Water samples were collected from sinks in patients bathrooms in general hospital of Diwaniyah city, and were passed through sterile 45 μ filters. Using sterile forceps, the filters were placed on Sabouraud dextrose agar ⁽⁹⁾ containing antibiotics. Plates were incubated at 30°C and checked daily for growth for at least 28 days. Fungi were identified using appropriate taxonomic guides ^(10,11).

Results :-

Results are summarized in table 1. Fungi were recovered from hospital taps water in patients bathrooms. All samples were positive for culture. Filamentous fungi were isolated from all sites tested, whereas yeasts were isolated from only 33.33%, and both from 33.33% of samples.

A total of sixteen species of filamentous fungi and two of yeasts had been isolated. The most prevalent ones were, *Aspergillus* species, isolated from 83.33%, and *Rhodotorula glutinis*, from 33.33% of examined samples.

The most common species of *Aspergillus* were *Aspergillus flavus*, isolated from 58.33% of samples with frequency percentage of 43.33%, followed by *Aspergillus terreus*, isolated from 50% (11.66), and *Aspergillus niger* from 25% (5%).

According to frequency percentage, *R. glutinis* came thirdly (8.33%), beyond *A. flavus* and *A. terreus*, followed by *Penicillium* species and *Cladosporium sp.* With frequency of 6.66% and 5% respectively.

Other *Aspergillus* species had been isolated were, *Aspergillus niveus* and *Aspergillus sydowii*, isolated from 16.66% of samples with frequency percentage of 3.33% for both, also *Aspergillus aculeatus*, *Aspergillus ochraceus* and another unidentified species were isolated, each one of them from 8.33% of samples, and the frequency of isolates was 1.66% for all.

Three species of *Penicillium* were isolated from 8.33% of samples, the most frequent one was *Penicillium crustosum* (3.33%).

Table 1. Fungi identified from hospital taps water

	Positive samples%	No. of isolates	Frequency %
<i>Alternaria alternata</i>	8.33	1	1.66
<i>Aspergillus aculeatus</i>	8.33	1	1.66
<i>Aspergillus flavus</i>	58.33	26	43.33
<i>Aspergillus niger</i>	25.00	3	5.00
<i>Aspergillus niveus</i>	16.66	2	3.33
<i>Aspergillus ochraceus</i>	8.33	1	1.66
<i>Aspergillus sp.</i>	8.33	1	1.66
<i>Aspergillus sydowii</i>	16.66	2	3.33
<i>Aspergillus terreus</i>	50.00	7	11.66
<i>Cladosporium sp.</i>	8.33	3	5.00
<i>Penicillium crustosum</i>	8.33	2	3.33
<i>Penicillium camemberti</i>	8.33	1	1.66
<i>Penicillium olsonii</i>	8.33	1	1.66
<i>Rhodotorula glutinis</i>	33.33	5	8.33
<i>Stemphylium sp.</i>	8.33	1	1.66
Unidentified species 1	8.33	1	1.66
Unidentified species 2	8.33	1	1.66
Unidentified yeast	8.33	1	1.66

Discussion :-

In this study conducted in Diwanayah general hospital, it was shown that all water samples taken from sinks in patients bathrooms harbored fungi (molds and yeasts).

There are several studies worldwide conducted on hospital water.

Arvanitidou *et al.* ⁽³⁾ in Greece isolated fungi from 76.2% of a hospital water samples, while yeasts were isolated from 11.9% of samples, and prevailing genera were, *Penicillium spp.*, *Aspergillus spp.* and *Candida*.

In another study included a paediatric bone marrow transplantation unit of the National Hospital University of Oslo, Norway ⁽⁴⁾, filamentous fungi were recovered from 94% of all water samples taken inside the hospital, the source of contamination was the municipal water system.

Anaissie *et al.* ⁽⁵⁾ recorded a number of fungi from water of a hospital, located in Little Rock, and in special *Penicillium* species, which were present in 43% of the samples of water from patient care area, and *Aspergillus* species, which recovered in 21% of samples.

Penicillium species and *Aspergillus* species also were the most frequent fungi isolated from 51% of water samples collected from the distribution system of a big hospital in Turkey ⁽¹²⁾.

The current study also showed that *Aspergillus* species were the most frequent isolated species. We also recovered other molds, such as *Penicillium* species, these organisms are rarely associated with infections.

In many similar studies, *Aspergillus* and *Penicillium* species were the prevailing species ^(3-5,12).

Some of *Aspergillus* species are medically important, and although *Aspergillus fumigatus* is the most common etiologic agent, being responsible for 80-90% of human infection, it is not the only pathogen in this genus. Other species encountered are *A. flavus* (10-15%), *A. terreus* (2-5%), *A. niger* (1-2%) and *A. nidulans* (less than 1%) ⁽¹³⁾.

A. flavus (the most frequent isolated species in this current study) is the predominant cause of *Aspergillus* sinusitis.

Anaissie *et al.* ⁽⁸⁾ believed their results to be among the first to suggest the possibility that nosocomial aspergillosis in patients with cancer could be acquired from hospital water. In other cases of nosocomial infections, the source of fungi was hospital water system ^(7,14).

Contamination of water with fungi and bacteria represents a potential risk for waterborne diseases, and may be attributed either to primer pollution of ground water and insufficient treatment and disinfection, or to the formation of biofilms in the water distribution systems ⁽³⁾.

Anaissie *et al.* ⁽⁵⁾ suggested that waterborne molds enter the hospital via municipal water and are subsequently integrated in the water distribution system biofilm. The forming of biofilms in water distribution systems yielded various filamentous fungi and might be responsible for sudden increases in the contamination level of hospital water ⁽¹⁵⁾.

The hypothesis said that airborne molds originate from hospital water and not contaminated outside air, had been supported by molecular studies.

In a case of patient died of *A. fumigatus* pneumonia ⁽⁸⁾, isolates from the patient's room shower wall showed the same genotype as the isolate obtained by bronchoscopy, whereas repeated testing of room air failed to yield *A. fumigatus*.

In the same paper, it was shown that the concentration of airborne molds was significantly higher in areas of major water use (such as patient showers) than in patient rooms and hallways, this finding suggests that aerosolization of waterborne molds occurs after water use.

In another study ⁽⁷⁾, two patients died of dissemination fusarial infection had isolates with a molecular match with strains isolated from water-related environmental sources.

Waterborne *Aspergillus* may lead to secondary aerosolization of fungal spores and exposure of patients through inhalation ⁽¹³⁾. So it was shown that there is an association between the cleaning of water-related environmental surfaces and a reduction in the airborne concentration of medically important filamentous fungi in a hospital ward housing immunocompromised patients ⁽¹⁶⁾.

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عزل الفطريات من المياه في المستشفى العام لمدينة الديوانية

رنا صالح الطويل
كلية التربية/جامعة القادسية

الخلاصة :-

من المعروف إن مصادر المياه تستوطن من قبل الفطريات الممرضة لذا فقد تم دراسة انتشار الفطريات في نماذج من مياه الحنفيات في المستشفى العام في الديوانية. و لغرض تحليل المياه استخدمت طريقة الترشيح. عزلت الفطريات الخيطية من جميع العينات المأخوذة، في حين ظهرت الخمائر في 33.33% من العينات. كانت الأنواع الأكثر شيوعا هي *Aspergillus flavus* عزل من 58.33% من العينات ثم *Aspergillus terreus* عزل من 50% و *Rhodotorula glutinis* عزل من 33.33% من العينات و *Aspergillus niger* عزل من 25% من العينات المفحوصة.