CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
http://doi.org/10.5281/zenodo.3270498

Available online at: http://www.iajps.com Research Article

PREVALENCE OF FUNGI IN THE WATER AND DIALYSIS SOLUTIONS

[1]Dr Abdul Wasae Ghumman, [2]Dr Zahra Khanum
[1]Services Institute of Medical Sciences Lahore
[2]Allied Hospital Faisalabad

Article Received: May 2019 **Accepted:** June 2019 **Published:** July 2019

Abstract:

Objectives: *This research work aimed to check the water and dialysis solutions for the determination of the multiplicity, prevalence & and fungi distribution in the dialysis ward of General Hospital, Lahore.* ***Methodology:*** *We collected 168 samples of the water from the dialysis machines at different times as well as dialysis solutions. Sabouraud dextrose agar was in use for the culturing of the samples we incubated them at normal room temperature.*

Results: *Our research work elaborated that different kinds of fungi were available in the system of water of dialysis ward. We identified total 8 kinds of filamentous fungi and 3 kinds of yeasts & Yeast-likes. The most frequent genera of filamentous fungi were Aspergillus, Fusarium & Penicillium and the most common separated yeast was the Candida-tropicalis.*

Conclusion: *The findings of this research work showed that there can be contamination of various types of fungi in the water system of dialysis wards which usually reside in the piping of the dialysis machine. Additionally, contamination because of fungi because of exposure to plastic material in the pipes of the dialysis machine is much considerable. For decreasing the contact of the patients who were suffering from the deficiency of the renal function to contaminated sources of water, there should be a practice of monitoring the water system for mycological contamination. The dialysis solution should be in a place which prevents the contamination of these kinds of fungi.*

KEY WORDS: *Contamination, Kidney, Dialysis, Fungi, Water System, Dialysis Solution, Incubated, Aspergillus.*

Corresponding author:
Dr. Abdul Wasae Ghumman,
Services Institute of Medical Sciences Lahore

QR code

Please cite this article in press Abdul Wasae Ghumman et al., ***Prevalence Of Fungi In The Water And Dialysis Solutions.,*** *Indo Am. J. P. Sci, 2019; 06(07).*

INTRODUCTION:

Water is normally much in use in the dialysis units of the hospitals in every day. The reverse osmosis units formulate the water with satisfactory chemical quality. For secure and effective hemodialysis, the micro-biological quality of the water is much important. Every patient has exposure from 18,000 to 36,000 liters' water in the process of dialysis each year [1]. Very high contamination of microbes can be available in the equipment of dialysis which has the ability to impact the patients. There are many types of saprophytic fungi which naturally present in soil or water; these species are present as scarcely pathogens in normal host. There is high risk of such pathogens in the patients under hemodialysis due to deficiency in the immunity system and major reasons of high rate of mortality in these patients are infections [2]. Different investigators showed their belief that the water of the hospital is the main source for the pathogens of fungi [3-7]. The growth of the fungi is very fast in the treated water as well as cultured media & prevents their feasibility for very long duration.

To produce the bio-films, tubing and the tanks are most suitable places [2, 3, 8]. Normally, there is distribution of water in the PVC pipes in the whole system of water. Because of such methods, water can be cause of the transportation of the microbes in the dialysis equipment. Additionally, the dialysis solutions are necessary for the processes of dialysis which can get the contamination of various kinds of fungi [3]. Normal checks of microbes are present in routine of the at hemodialysis units but there is a need of inclusion the microbial analysis. Many investigators were available with the belief that growth of the microbes in the dialysis solutions is the outcome of the availability of endotoxins [9, 10]. Different species of the fungi were present in the samples of water from hemodialysis unit as Trichoderma, Acremonium, penicillium, Cladosporium, verticillium, Aspergillus, Fusarium, Chrysosporiu & Candida parapsilosis [2, 3, 7]. This case work aimed to examine the water system and dialysis solutions for the determination of the diversity, prevalence and distribution of the various species of fungi in the dialysis center of General Hospital, Lahore.

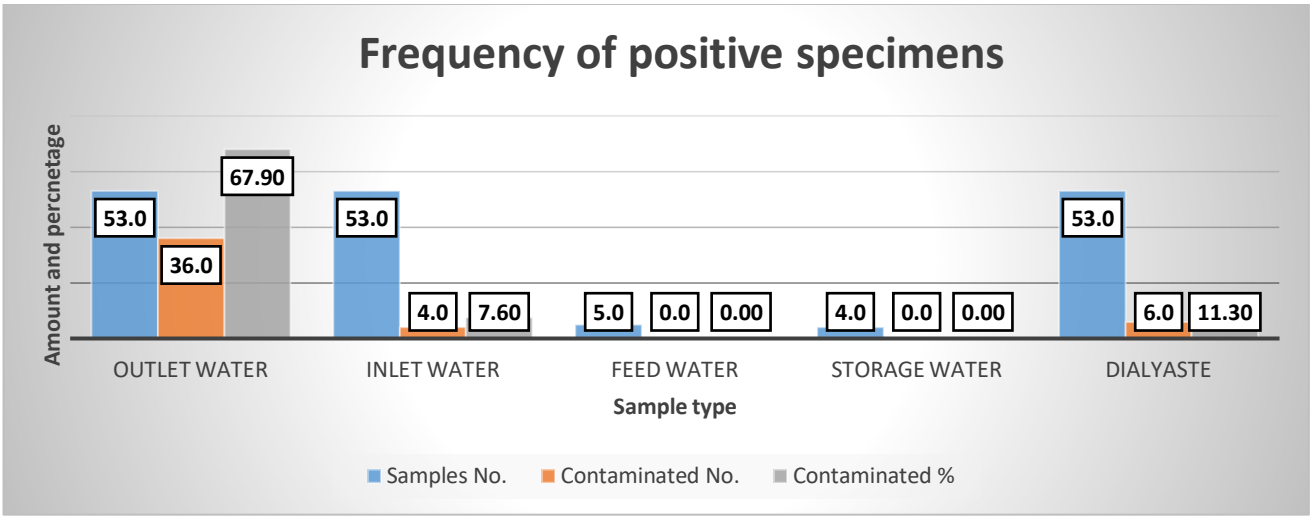
METHODOLOGY:

The current research work carried out in the dialysis unit of nephrology department of General Hospital, Lahore Pakistan. We collected the samples of water from 4 different points of the water system at the time of dialysis treatment. The four points included the water of the storage tank, water in the receiving tape, water in the pipes and outlet of the dialysis machines. Additionally, we took the samples from every dialysis machine (fifty-three specimens) (Table-1).

Chaet-1 is elaborating the whole presentation of the frequency of positive specimens available in Table-1.

Table-1: Frequency of positive samples.

Sample type	Samples	Contaminated	
	No.	No.	%
Outlet water	53.0	36.0	67.90
Inlet water	53.0	4.0	7.60
Feed water	5.0	0.0	0.00
Storage water	4.0	0.0	0.00
Dialysate	53.0	6.0	11.30
Total	168.0	46.0	27.40



Specimens with minimum ten milliliter waters gathered in the separate sterile containers and then we sent the specimens to the laboratory. Culturing of twenty-five micro liter samples carried out on Sabouraud's dextrose agar and incubated at room temperature in the absence of oxygen.

We counted all the isolated fungi and we also separated single genre from each fungus. The slide culture method with the utilization of macroscopic & microscopic morphology was in use for the detection of the filamentous fungi. Additionally, formation of the germ tube and for the identification of the yeast and its similar microbes with the help of with microscopic morphology on the Cornmeal agar plate & on CHROM-Agar plate performed.

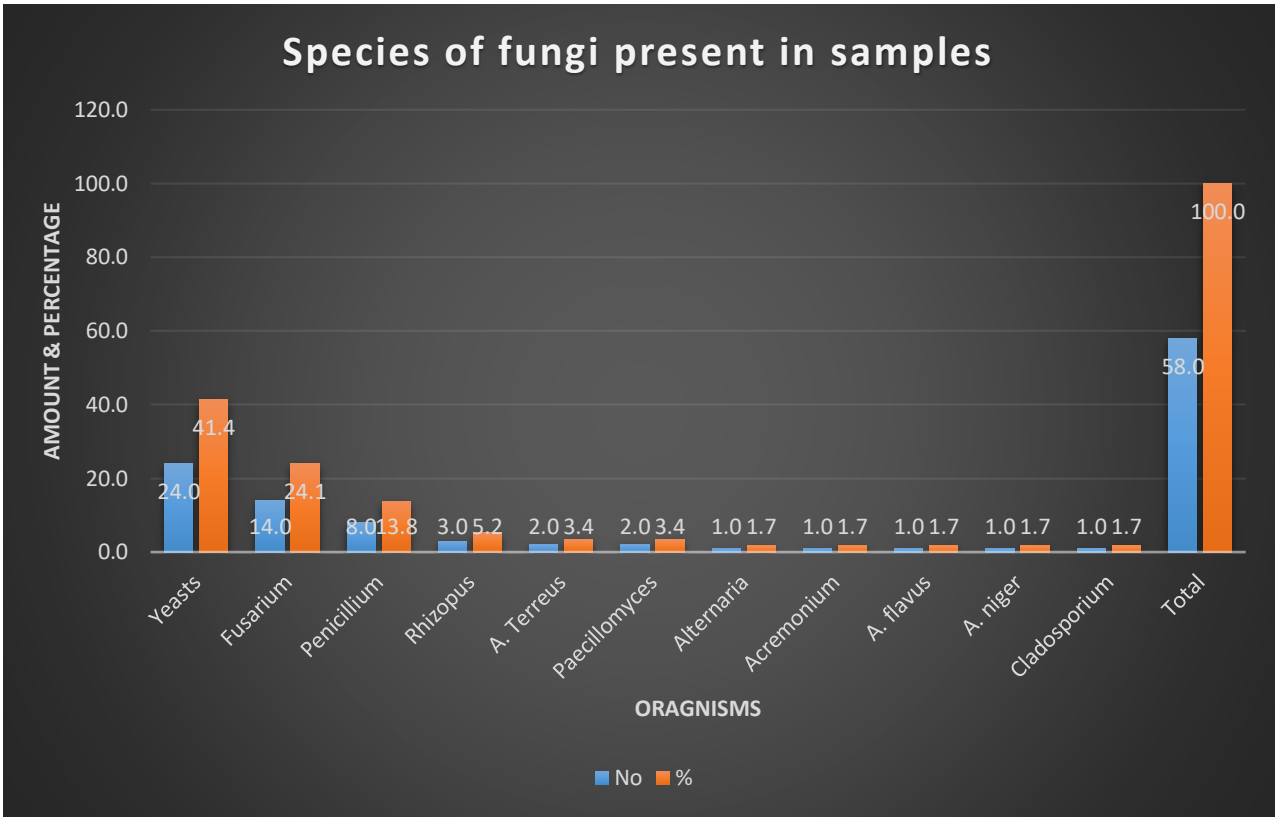
RESULTS:

We collected one hundred and sixty-eight samples from dialysis units in this duration of study. There were more than twenty machines in the unit which were in use from past many years. Normally, dialysis center was using water from a normal public supply of water having origin from canals. We collected total 150 samples of water from various points of the system of water distribution yielded forty isolates of fungi. Additionally, six out of fifty-three (11.30%) dialysate specimens were available with positive isolates of fungi (Table-1). None of forty-six specimens formed any growth of fungi. Filamentous fungi & yeasts (yeast-likes) were separated from 41.40% (n: 24) & 58.60% (n: 34) specimens correspondingly. Detection of multiple growths of fungi performed in 28.30% samples & 71.70% (n: 33) was yielded single organism. In the filamentous separates of fungi, the most common specie was Fusairum present in 24.1% (n: 14) followed by Pencillium available in 13.80% (n: 8) (Table-2).

Chart-1 is the complete elaboration of the Table-2 with the organisms separated from the samples with their amount and percentage.

Table-2: Species of Fungi Present in Samples

Organisms	No	%
Yeasts	24.0	41.4
Fusarium	14.0	24.1
Penicillium	8.0	13.8
Rhizopus	3.0	5.2
A. Terreus	2.0	3.4
Paecillomyces	2.0	3.4
Alternaria	1.0	1.7
Acremonium	1.0	1.7
A. flavus	1.0	1.7
A. niger	1.0	1.7
Cladosporium	1.0	1.7
Total	58.0	100.0

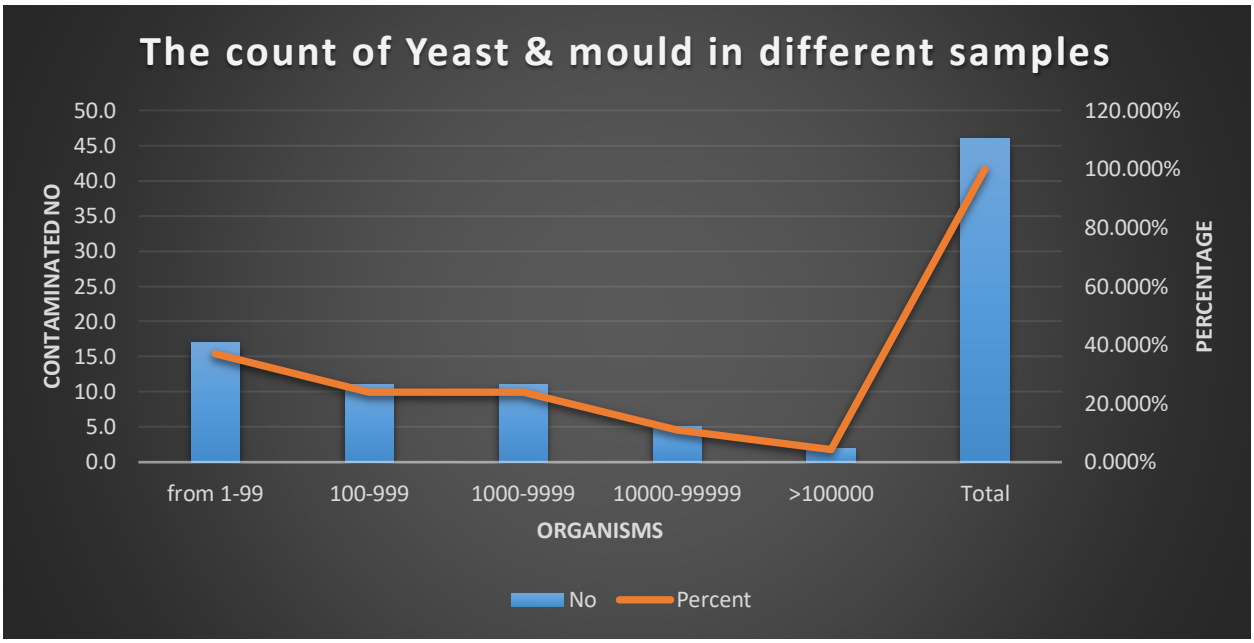


In the current research work, the detection of twenty-four 24 yeasts & yeast-likes carried out. The most frequent available yeast was C. tropicalis present in 29.20% (n: 7) samples followed by C. cruzei in 20.80% (N: 5), Saccharomyces species in 12.50% (n: 3), Trichosporon species in 12.50% (n: 3), C. glabrate in 4.20% 9n: 1), C. guilliermondii in 4.20% 9n: 1), and Candida species in 16.60% (n: 4) specimens. The complete detail of the level of contamination of the samples because of fungi are available in Table-3. We observed the greatest contamination level (greater than 100,000 cfu/ml) in 4.30% samples while 37.0% samples were in the range of 1.0 to 99.0 cfu/ml (Table-3).

Table-3: The Count of Yeast & Mould in Different Samples

Organisms	Contaminated	
	No	Percent
from 1-99	17.0	37.000%
100-999	11.0	23.900%
1000-9999	11.0	23.900%
10000-99999	5.0	10.900%
>100000	2.0	4.300%
Total	46.0	100.0%

Chart-3 is providing the complete elaboration of the Table-3.



DISCUSSION:

There is very large water system in the dialysis units of hospitals. There are many meters of surface of osmosis membranes, piping for distribution water, the tanks for water storage & several meter line for inlet. There should be a calculation of the outlet line from every dialysis machine. It is very necessary to keep all the equipment in extreme good position which provide prevention to the growth of organisms. So, it is very necessary to check the whole system of water used in hemodialysis. Different research reports displayed that that there are serious risks linked with the contamination of the dialysis water [11, 12]. There are high risks of the development of the fungal infections in the patients suffering from chronic functional lack in kidney. In the recent research work, only four out of fifty-three specimens gathered from inlet water were present with contamination of fungi & appeared with low count of fungi (1.0 to 99.0 cfu/ml). There is supposition that water after the treatment by reverse osmosis has no elements of fungi and this agrees with the findings of many other research works [2].

The water from outlet of dialysis machine normally contain salt solutions, glucose in the duration of the procedure of dialysis procedure [2]. There are many nitrogen and compounds containing carbon in the liquid of the dialysis machine from the blood of the patients that provide a very sensitive medium for the development of many species of fungi [2]. In current research work, we recovered fungi from 67.90% samples from outlet water of the dialysis units. This prevalence is much lower than the concluded frequency by Arvanitidou [8] as (76.20%) & Pires Gonsalves [2] as 90.0% who stated from the dialysis units in Greece & Brazil correspondingly. The presence of the high proportion of the fungal elements in the outlet water are vital for the contamination of the dialysis machines. In this research work, the most common fungi in the outlet water were Fusarium & Candida. Past research works have displayed the dominant fungi separated from the outlet water were Fusarium [2], Cladosporium [2, 3], Aspergillus & Penicillium [3] & Trichoderma [7].

CONCLUSION:

The findings of this research work conclude that the supply of water for dialysis units can have the contamination of different species of fungi particularly in the piping of the dialysis machine. To decrease the exposure of the patients suffering from the abnormal behavior of the kidneys to the contaminated sources of water, there should be a regular monitoring of the mycological contamination in the systems of water distributions.

REFERENCES:

1. Anaissie EJ, Costa SF. Nosocomial aspergillosis is waterborne. Clin Infect Dis 2001; 33:1546-1548.
2. Warris A, Gaustad P, Meis JFGM, Voss A, Verweij PE, Abrahamsen, TG. Recovery of filamentous fungi from water in a pediatric bone marrow transplantation unit. J Hosp Infect. 2001; 47:143-148.
3. Kennedy H, Williams C. Infection risk for filamentous fungi in water in a paediatric

haematology D oncology ward. Int J Antimicrob Agents, 2007;29: S485.
4. Varo SD, Martins CH, Cardoso MJ, Sartori FG, Montanari LB, Pires-Goncalves RH. Isolation of filamentous fungi from water used in a hemodialysis unit. Rev Soc Bras Med Trop. 2007; 40:326-331.
5. Pontoriero G, Pozzoni P, Andrulli S, Locatelli F. Water quality cuts down the chronic inflammatory risk: How to obtain it and keep it over time. G Ital Nefrol. 2005;22: S70–S74.
6. Vorbeck-Meister I, Sommer R, Vorbeck F, Hörl WH. Quality of water used for haemodialysis: Bacteriological and chemical parameters. Nephrol Dial Transplant. 1999; 14:666-675.
7. Arvanitidou M, Spaia S, Katsinas C, Pangidis P, Constantinidis T, Katsouyannopoulos V, Vayonas G. Microbiological quality of water and dialysate in all haemodialysis centres of Greece. Nephrol Dial Transplant. 1998; 13:949-954.
8. Montanari LB, Sartori FG, Oliveira Cardoso MJ, Varo SD, Pires RH, Leite CQF, et al. Microbiological contamination of hemodialysis center water distribution system. Rev Inst Med Trop S Paulo. 2009; 51:37-43.
9. Nystrand R. The microbial world and fluids in dialysis. Biomed Instrom Technol. 2008; 42:150-159.
10. Gonsalves RHP, Sartori FG, Montanari LB, Zaia JE, Melhem MSC, Mendes-Giannini MJS, et al. Occurrence of fungi in water used at a hemodialysis center. Lett Appl Microbiol. 2008; 46:542-547.
11. Skarupskiene I, Bumblyte IA, Kuzminskis V. The level of endotoxins in hemodialysis water and dialysate. Medicina (Kaunas). 2007;43(Suppl 1):81-84.
12. Arvantdou M, Sapia S, Velogarki A, Kanetidis D. High level of recurrence of fungi from water and Dialysis in hemodialysis units. J Hosp Infect 2004; 45:225-230.