

Prevalence of Potential Pathogenic *Candida* Species in Hospital and Municipal Sewages in Southwestern Province of Saudi Arabia: A Microarray Analysis of Sewage Samples

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Dear Editor,

Candida species such as *Candida albicans*, *Candida glabrata*, *Candida krusei*, *Candida parapsilosis* and *Candida tropicalis* are reported to cause various fungal infections in humans. A group of the normal flora of human and animal gastro-intestinal tract corresponds to large part of bacterial communities and a component of *Candida* species. *C. albicans* was commonly isolated from gastro-intestinal tract of human and other mammals. *C. tropicalis* was also isolated most frequently from healthy animals such as goat and sheep [1]. There is a raising concern about high incidence of infections caused by non-albicans species. However, to the best of our knowledge, there is no data on the prevalence of *Candida* species in sewages of hospitals, and municipal sewages including waste-water from the animal slaughter house and fish markets in southwestern province of Saudi Arabia.

Fifty mL of untreated sewage samples were collected at 9 AM on different days in sterile containers (Falcon tubes; Becton Dickinson, USA) from two hospital sewage treatment plants as well as from four municipal sewage treatment plants [Table/Fig-1] in Jazan Province, Saudi Arabia. All the collected samples were frozen [2], transported and molecular analysis by FilmArray (BioFire Diagnostics, USA) was carried out within 3 days of sample collection at the molecular biology laboratory at King Abdulaziz University Hospital, Jeddah. Molecular analysis by FilmArray (multiplex PCR-based) Blood Culture Identification Panel (BCID) is helpful to perform microbiological analysis directly from samples as it offers acceptable sensitivity and reasonable suitability with conventional microbiological methods [3]. Multiplex PCR-based FilmArray BCID panel was used to detect the gram-positive bacteria, gram-negative bacteria [2] and *Candida* species: *Candida albicans*, *Candida glabrata*, *Candida krusei*, *Candida parapsilosis* and *Candida tropicalis*. The FilmArray assay has 99.9% specificity and 98% sensitivity (BioFire Diagnostics, USA). In present study, four *Candida* species such as *C. albicans*, *C. glabrata*, *C. parapsilosis* and *C. tropicalis* were detected in community sewage-I and general hospital sewage. Similarly, five species of *Candida* such as *C. albicans*, *C. glabrata*, *C. parapsilosis*, *C. tropicalis* and *C. krusei* were detected in community sewage-II and tertiary hospital sewage. However, three species of *Candida* such as *C. parapsilosis*, *C. tropicalis* and *C. krusei* were detected in sewage samples of the fish market and two species of *Candida* such as *C. parapsilosis* and *C. krusei* were detected in sewage sample of animal slaughter house [Table/Fig-1]. *C. albicans* was not detected in sewage samples of fish market and animal slaughter house. Abu-Elteen KH et al., isolated potentially pathogenic *Candida* species such as *C. albicans* and *C. krusei* from Al-Baqa'a sewage plant [4]. Biedunkiewicz A and Ozimek T also isolated *C. albicans*, *C. glabrata*, *C. dubliniensis*, *C. krusei*, *C. utilis* and *C. lipolytica* from wastewater

treatment plant [5]. The present study indicates prevalence of *C. albicans* and non-albicans in various sewages which was analysed by FilmArray (BioFire Diagnostics, USA) that was not reported earlier. Knowledge of prevalence and inquiry of spread of these potential pathogens are crucial for control measures to reduce their spread in transmission.

S.No	Samples from various sewage treatment plants, Jazan Province	Detected <i>Candida</i> species
A	Sewage from municipal sewage treatment plant	
1	Sewage from community sewage center-I	<i>Candida albicans</i>
		<i>Candida glabrata</i>
		<i>Candida parapsilosis</i>
		<i>Candida tropicalis</i>
2	Sewage from community sewage center-II	<i>C. albicans</i>
		<i>C. glabrata</i>
		<i>C. krusei</i>
		<i>C. parapsilosis</i>
		<i>C. tropicalis</i>
3	Sewage from fish market sewage tank	<i>C. krusei</i>
		<i>C. parapsilosis</i>
		<i>C. tropicalis</i>
4	Sewage from animal slaughter house sewage tank	<i>Candida krusei</i>
		<i>C. parapsilosis</i>
B	Sewage from hospital sewage centers	
1	Sewage from tertiary hospital sewage tank	<i>C. albicans</i>
		<i>C. glabrata</i>
		<i>C. krusei</i>
		<i>C. parapsilosis</i>
		<i>C. tropicalis</i>
2	Sewage from general hospital sewage tank	<i>C. albicans</i>
		<i>C. glabrata</i>
		<i>C. parapsilosis</i>
		<i>C. tropicalis</i>

[Table/Fig-1]: Detection of potentially pathogenic *Candida* species in various sewage samples using FilmArray.

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