

Investigating correlation of faecal indicator bacteria and potential pathogenic fungi on Dublin beaches in the interest of public health



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Introduction

Sandy beaches are usually the preferred location for leisure activities but may pose a risk to public health in particular to children, the elderly and immunocompromised individuals. Beach sand and marine water may be a reservoir of opportunistic and pathogenic microbes, as well as faecal indicator bacteria (FIB) that influence the bathing water quality status.

The growth and the proliferation of microbes in beach sand and water are not restricted to bacteria but include also different groups of fungi such as potentially pathogenic and allergenic moulds, yeasts and dermatophytes. Currently, no clear guidance about pathogenic fungi levels in relation to public health is available for these environments.

Aim

This study aims to raise the profile of fungal communities for future legislation of microbial sand contamination and looks to correlate these with levels of FIB and their impact on human health.

Materials and Methods

Sandymount, **Portrane**, **Donabate**

Fungi medium
 ✓ Sabourad's dextrose agar + Chloramphenicol (8 – 10 days)
 ✓ Mycosel (15 – 20 days)

Faecal Indicators (FI)
Escherichia coli ISO16649:1:2001
Intestinal enterococci ISO7899-2:2000

Morphological identification
 ✓ Filamentous, Dermatophytes and Yeast
 ✓ Candida ID agar (94382) at 30° C for 24 h

Microscope identification: Fungal parameters
 ✓ Allergenic and pathogenic moulds – *Aspergillus sp.*, *Penicillium sp.*, *Fusarium sp.*
 ✓ Dermatophytes – indicators of human/animal dermal contamination (including *Trichophyton rubrum*, *Trichophyton interdigitale*, *Trichophyton terrestre*)

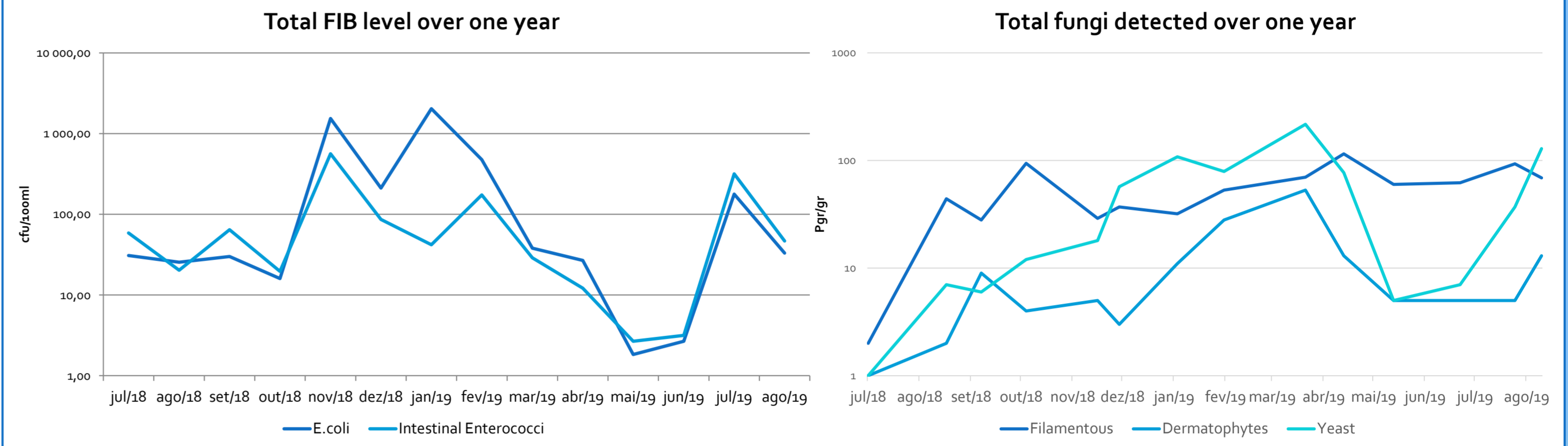
Conclusions

Faecal Indicator Bacteria and fungi populations vary during the year. Potentially pathogenic and allergenic moulds, such as *Penicillium sp.*, *Aspergillus sp.*, *Fusarium sp.*, *Cladosporium sp.*, and yeast, such as *Candida sp.*, are present in Sandymount (SMC), Donabate (DB) and Portrane (PR) strands and water, and may thus represent a public health risk. Sandymount and Portrane strands are at risk bathing waters, while Donabate Strand retains its blue flag status.

The presence of potentially pathogenic fungi in both at risk and excellent beaches highlights the need for EU legislation to monitor and regulate microbial quality of beach sand.

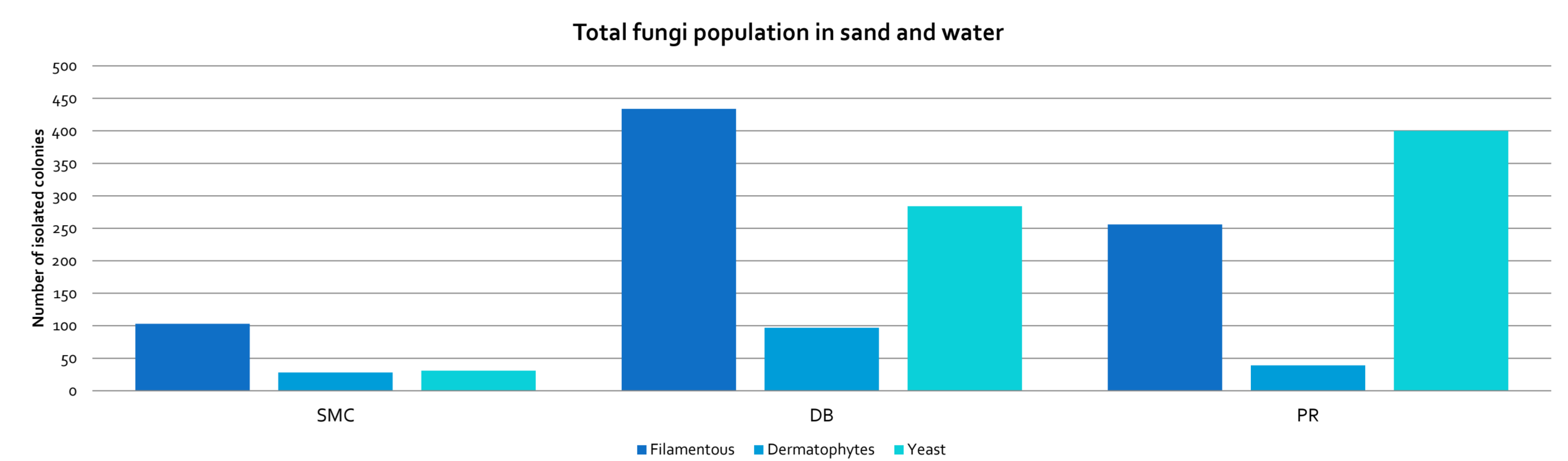
Results

Comparison between FIB in water and fungi population in water and sand



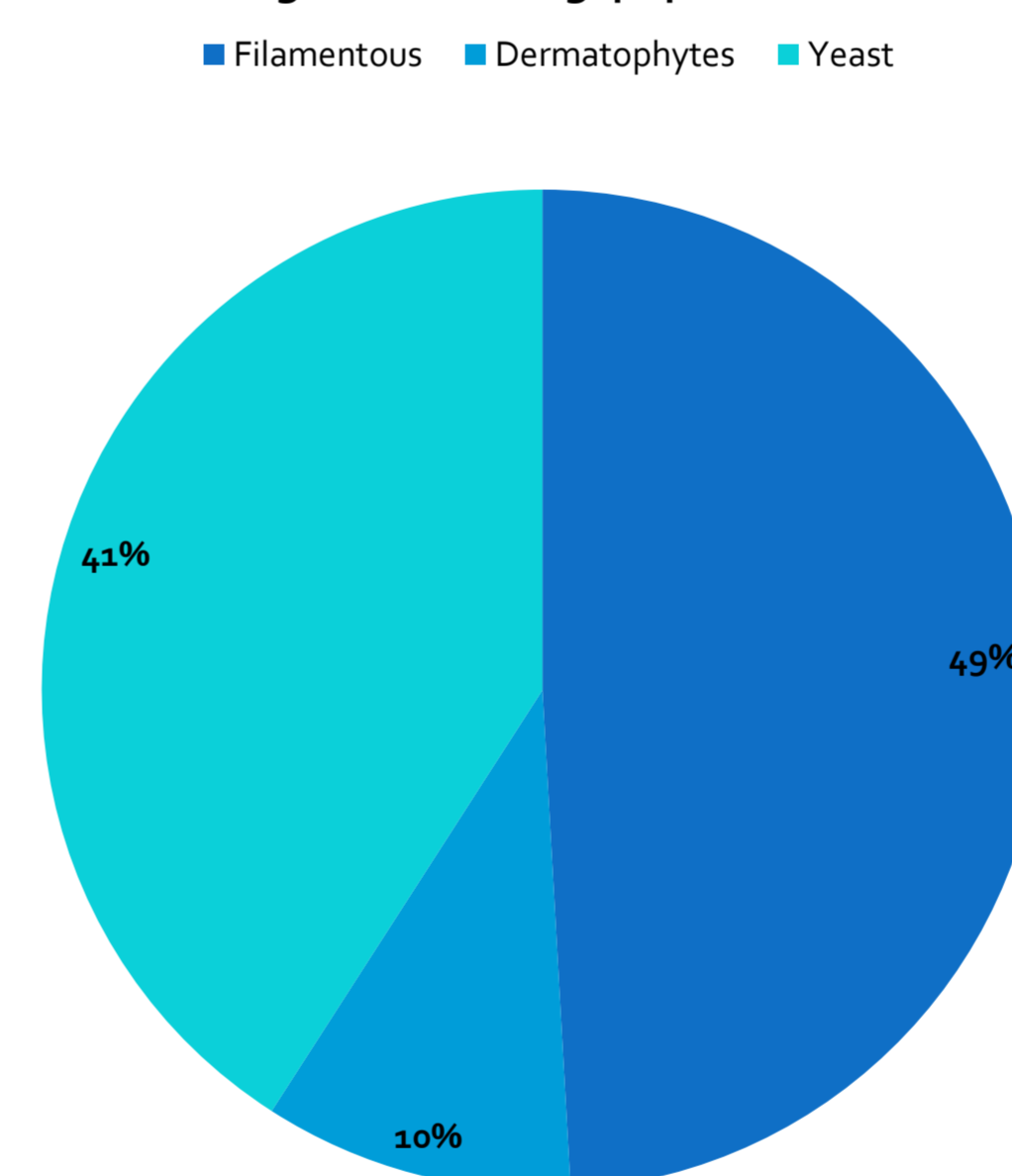
Fungi were detected in sand and in water showing seasonal variation. Higher levels of yeast were associated with higher levels of FIB during the year. Dermatophytes and yeast levels varied, while filamentous fungi remained constant.

Total population of fungi detected over the year

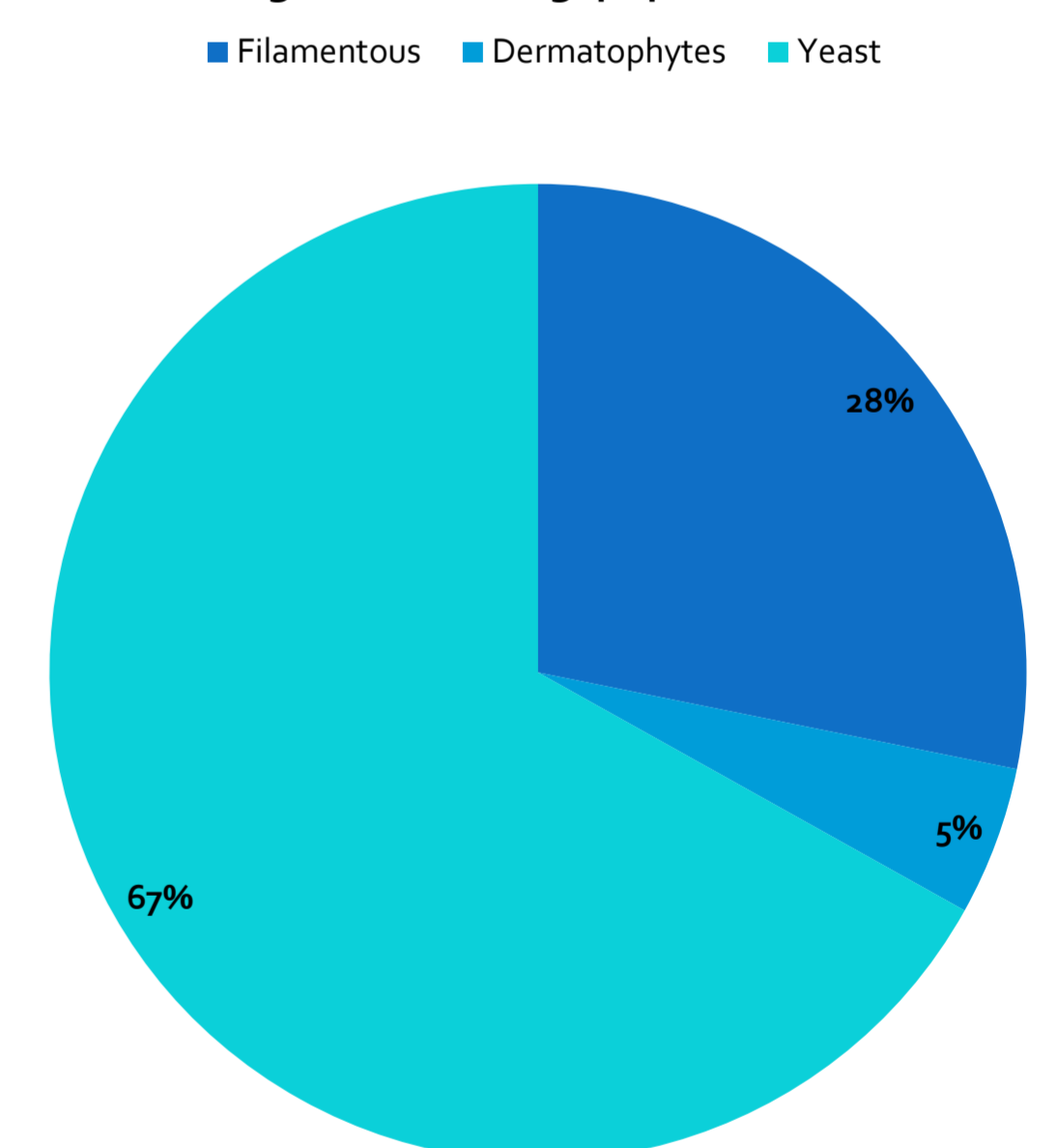


The total number of fungi in sand and water varied from beach to beach depended on the beach characteristics. The highest level of filamentous fungi was present in Donabate Strand (DB), while Portrane Strand (PR) had the highest levels of yeast. Sandymount Strand (SMC) has the lowest levels of both

Percentage of total fungi population in sand



Percentage of total fungi population in water



In sand the highest percentage of potentially pathogenic and allergenic fungi is represented by filamentous fungi, in contrast of the percentage related to the water where yeast has been recorded as the highest value. Filamentous fungi in sand included *Penicillium sp.*, *Aspergillus sp.*, *Fusarium sp.*, *Cladosporium sp.*. A high presence of *Candida sp.* has been recorded especially in water samples.

Acknowledgements

