Characteristic of airborne microbiota in highly urbanized locations in Sofia city, Bulgaria

Boyanka Angelova [1], Mihail Iliev[1], Ralitsa Ilieva[1], Ivan Nedkov[2], Veneta Groudeva[1]

[1]- Sofia University "St. Kliment Ohridski", Faculty of Biology

[2] - Bulgarian Academy of science, Institute of Electronics

Introduction

Airborne microbiota (AM) associated with particulate matters (PM), are widespread in the lower atmosphere layers. Since some airborne microorganisms have pathogenicity, they can lead to a wide range of diseases in human and other organisms. The intend of this study highlights the problem of composition and characteristics of AM with size-distribution, diversity and quantity in central urban site in Sofia (Faculty of Biology) during the summer season.

Material and Methods

Six-stage Andersen Impactor (fig. 1) was used for the quantitative analysis. This sampling device collects particles in the range from > 7 μm to 0.65 μm. This can be used as a visualization of particles penetration in respiratory tract.
The air-flown was adjusted at the rate of 28.3 L/min with a sampling time of 30 min. Nutrient agar with cycloheximide was used for bacteria and YGC agar for fungal enumeration (fig. 2).


Fig. 1. Six-stage cascade impactor
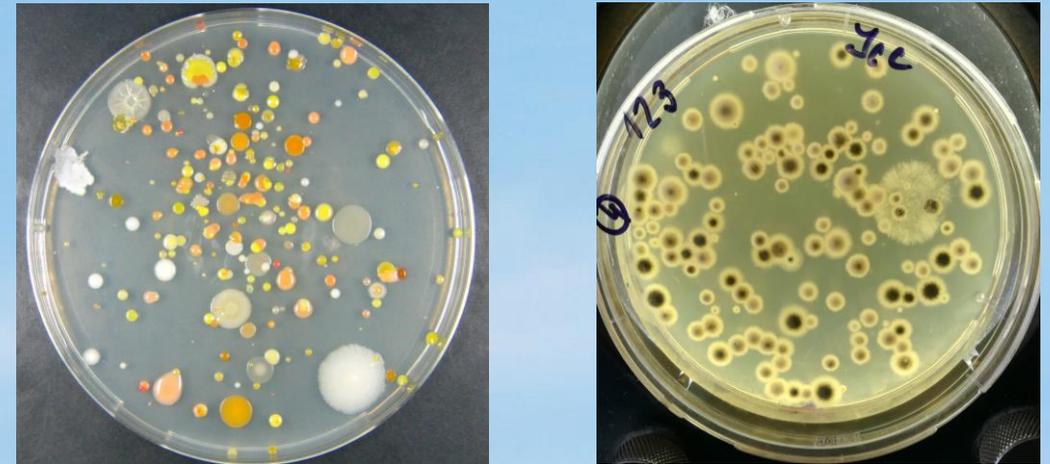
**Fig. 2.** Airborne microbiota on Nutrient agar and YGC

Results

The quantitative analysis showed the concentration ranging from 101 CFU/m^3 to 495 CFU/m^3 for bacteria, and respectively 298 to 1482 CFU/m^3 for fungi (fig. 3). The tendency mentioned was that the predominant airborne bacteria were identified on stage 1 (>7 µm). On the other hand, the prevalent airborne fungi usually had the highest concentration on stage 3 (3.3-4.7 µm) and stage 4 (2.1-3.3 µm) (fig. 4). The increasing of the microbial concentrations is closely related with increasing of PM concentration into the air.
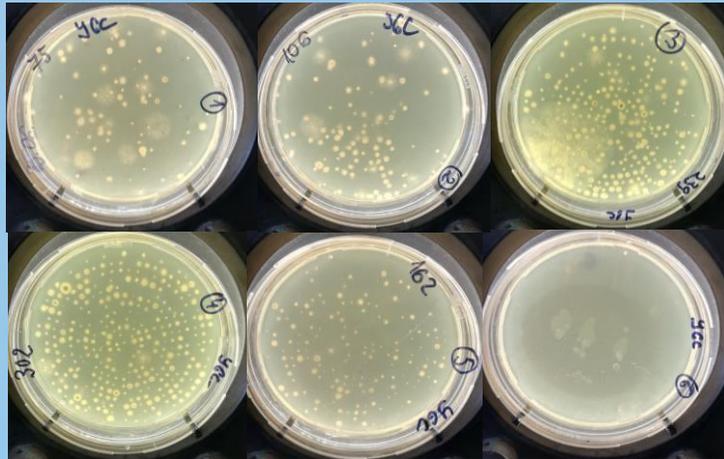
Fig. 3a. Fungal size distribution
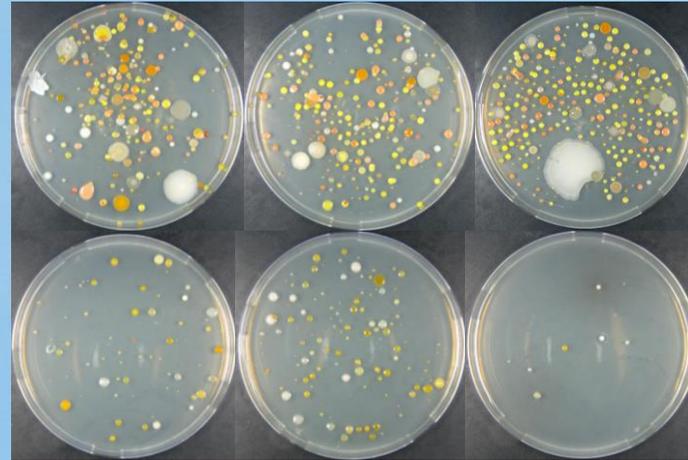
Fig. 3b. Bacterial size distribution
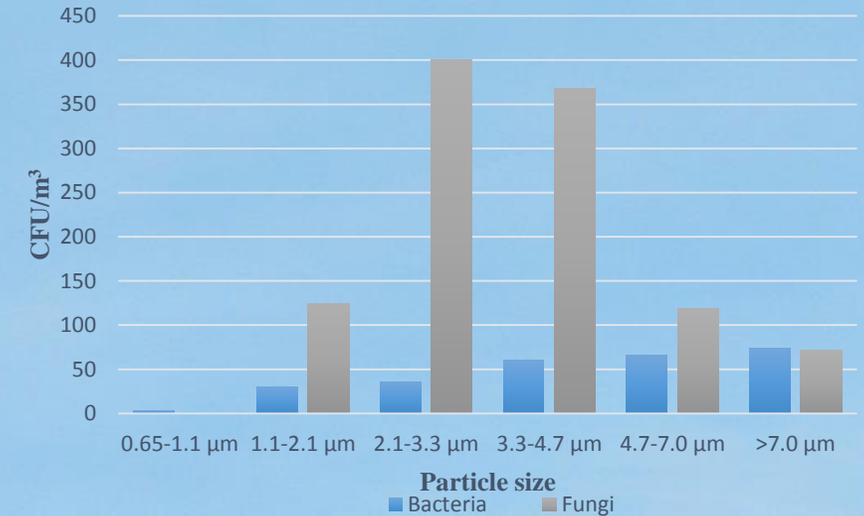
Fig. 4. Size distribution of airborne microorganisms

Conclusions

The analysis of microbiota has a significant contribution in air quality analysis of Sofia city and the present study can be an important stage in the strategy for prevention of human health and better air quality.