

Microfungi on Sandy Beaches: Potential Threats for People Enjoying Lakeside Recreation

Authors : Tomasz Balabanski, Anna Biedunkiewicz

Abstract : Research on basic bacteriological and physicochemical parameters conducted by state institutions (Provincial Sanitary and Epidemiological Station and District Sanitary and Epidemiological Station) are limited to bathing waters under constant sanitary and epidemiological supervision. Unfortunately, no routine or monitoring tests are carried out for the presence of microfungi. This also applies to beach sand used for recreational purposes. The purpose of the planned own research was to determine the diversity of the mycobiota present on supervised and unsupervised sandy beaches, on the shores of lakes, of municipal baths used for recreation. The research material consisted of microfungi isolated from April to October 2019 from sandy beaches of supervised and unsupervised lakes located within the administrative boundaries of the city of Olsztyn (North-Eastern Poland, Europe). Four lakes, out of the fifteen available (Tyrsko, Kortowskie, Skanda, and Ukiel), whose bathing waters are subjected to routine bacteriological tests, were selected for testing. To compare the diversity of the mycobiota composition on the surface and below the sand mixing layer, samples were taken from two depths (10 cm and 50 cm), using a soil auger. Micro-fungi from sand samples were obtained by surface inoculation on an RBC medium from the 1st dilution (1:10). After incubation at 25°C for 96-144 h, the average number of CFU/dm³ was counted. Morphologically differing yeast colonies were passaged into Sabouraud agar slants with gentamicin and incubated again. For detailed laboratory analyses, culture methods (macro- and micro-cultures) and identification methods recommended in diagnostic mycological laboratories were used. The conducted research allowed obtaining 140 yeast isolates. The total average population ranged from 1.37×10^{-2} CFU/dm³ before the bathing season (April 2019), 1.64×10^{-3} CFU/dm³ in the season (May-September 2019), and 1.60×10^{-2} CFU/dm³ after the end of the season (October 2019). More microfungi were obtained from the surface layer of sand (100 isolates) than from the deeper layer (40 isolates). Reported microfungi may circulate seasonally between individual elements of the lake ecosystem. From the sand/soil from the catchment area beaches, they can get into bathing waters, stopping periodically on the coastal phyllosphere. The sand of the beaches and the phyllosphere are a kind of filter for the water reservoir. The presence of microfungi with various pathogenicity potential in these places is of major epidemiological importance. Therefore, full monitoring of not only recreational waters but also sandy beaches should be treated as an element of constant control by appropriate supervisory institutions, allowing recreational areas for public use so that the use of these places does not involve the risk of infection. Acknowledgment: 'Development Program of the University of Warmia and Mazury in Olsztyn', POWR.03.05.00-00-Z310/17, co-financed by the European Union under the European Social Fund from the Operational Program Knowledge Education Development. Tomasz Bałabański is a recipient of a scholarship from the Programme Interdisciplinary Doctoral Studies in Biology and Biotechnology (POWR.03.05.00-00-Z310/17), which is funded by the 'European Social Fund'.

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