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ASSESSMENT OF MICROBIOLOGICAL RISK OF SWIMMING POOL WATER USING MONTHLY MONITORING DATA

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Introduction

Microbiological quality of swimming pool water is a critical factor in public health risk assessment, considering the potential for waterborne transmission of pathogenic and/or potentially pathogenic microorganisms. Although the water used in swimming pools usually originates from safe sources, such as drinking water network, microbiological contamination may result from anthropogenic sources, as well as deficiencies of treatment and disinfection systems.

According to the World Health Organization Guidelines for Safe Recreational Water Environments (Volume 2: Swimming Pools and Similar Environments, 2006), integrated microbiological and physicochemical monitoring represents an essential component in preventing risks associated with public swimming pool use. According to Romanian Order 119/2014 regarding hygiene and public health regulations, swimming pool water quality monitoring must be performed by determining specific microbiological indicators relevant for the assessment of fecal contamination and the evaluation of the disinfection process. Our study aimed the microbiological assessment of the swimming pool water which was conducted to determine compliance with current national regulatory requirements and to evaluate the safety of the environment provided for users.

Materials and methods

Swimming pool water samples were collected from covered teaching swimming pool facility and analyzed every two weeks throughout the study period: February 2024 to December 2025, in accordance with the requirements of Order 119/2014. The microbiological indicators determined included colony count at 37 °C, total coliforms, *Escherichia coli,* intestinal enterococci, and *Pseudomonas aeruginosa.*

All microbiological analyses were performed in accordance with applicable international standards in use. The colony count at 37 °C was determined according to SR EN ISO 6222:2004. Briefly, 1 mL of water sample was incorporated into the agar followed by incubation and enumeration of the colonies developed. Results were expressed as colony-forming units per milliliter (CFU/mL). Membrane filtration was used to quantify the total coliforms and *E. coli,* according to SR EN ISO 9308-1:2015 and SR EN ISO 9308-1:2015/A1:2017, respectively intestinal enterococci were determined according to SR EN ISO 7899-2:2002, while *Ps. aeruginosa* was

determined according to SR EN 16266:2008. The results for these microbiological indicators were expressed as colony-forming units per 100mL (CFU/100mL).

Results and conclusions

Throughout the monitoring period (February 2024 to December 2025), variations in the colony count at 37°C were observed. For this parameter, the recorded values were generally low, of the 45 samples analyzed, only one exceeded the maximum permissible limit of 200 CFU/mL established by Order 119/2014. The non-compliant value of 300 CFU/mL was recorded in February 2025.

During the summer months, three non-zero values of 26, 13 and 8 CFU/mL were recorded, all of which below the regulatory limit (Figure 1).

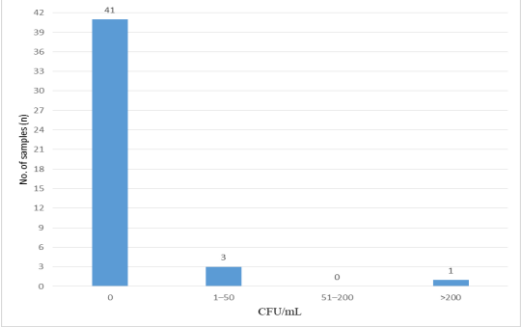


Figure 1 - Variation of colony count at 37°C values (CFU/mL)

The isolated exceedance of the colony count at 37°C was not associated with the detection of fecal indicators or *Ps. aeruginosa,* suggesting a transient increase in the general bacterial load rather than persistent microbiological deterioration. However, in the absence of physicochemical and operational data, the cause of this isolated event could not be determined. The subsequent sample showed compliant values, indicating effective corrective action and adequate operational control. For total coliforms, *E. coli,* intestinal enterococci, and *Ps. aeruginosa,* no colonies were detected in any of the analyzed samples throughout the study period, with all results recorded as 0 CFU/100mL.

The absence of the investigated fecal contamination indicators in all analyzed samples indicates compliance with the applicable microbiological regulatory requirements. The results of this study highlight the importance of regular microbiological monitoring of swimming pool water, particularly during extended periods of operation.

Regular assessment of the main microbiological indicators allows occasional changes in water quality to be identified and provides useful information for maintaining the required microbiological conditions. These findings support the value of regular microbiological monitoring for evaluating swimming pool water quality and maintaining compliance with regulatory requirements.