Analisis Keberadaan Nontuberculous Mycobacteria (NTM) dalam Air Bersih di Rumah Tangga dan Rumah Sakit X = Analysis of The Presence Nontuberculous Mycobacteria (NTM) in Tap Water of Household and X Hospital

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Abstrak

Penyakit paru-paru akibat bakteri Nontuberculous Mycobacteria (NTM) semakin banyak terdeteksi pada kelompok rentan. Ketahanan NTM terhadap klorin mencapai 1000 kali lipat dibandingkan E. Coli, memungkinkan NTM bertahan di sistem distribusi air. Penelitian ini bertujuan menganalisis konsentrasi dan spesies NTM pada air bersih di rumah tangga dan Rumah Sakit X, serta mengestimasi dosis paparan NTM pada kelompok rentan menggunakan metode quantitative microbial risk assessment (QMRA). Metode penelitian meliputi enumerasi bakteri dengan media Middlebrook M7H10, elektroforesis, PCR, dan sanger sequencing. Rata-rata konsentrasi total NTM di rumah tangga Kecamatan Beji dan Sukmajaya, dengan sumber PDAM dan air tanah, adalah 14,7 CFU/L dan 11,3 CFU/L. Di Rumah Sakit X, konsentrasi rata-rata adalah 5,3 CFU/L. Ditemukan 2 spesies NTM pada 10 isolat (20%), yaitu Gordonia sp., Mycobacterium wolinskyi, dan Mycolicibacterium mucogenicum di rumah tangga, serta Streptomyces sp. di Rumah Sakit X. Estimasi dosis risiko paparan NTM menggunakan QMRA menunjukkan dosis paparan di rumah tangga sebesar 0,00434 CFU dan di Rumah Sakit X sebesar 0,00197 CFU. Meskipun konsentrasi NTM tergolong rendah, diperlukan langkah-langkah pengurangan paparan NTM seperti penggunaan filter dan UV, mengganti jenis perbandingan, serta mengurangi stagnasi air bersih untuk mengurangi risiko kesehatan. .....The incidence of lung Lung diseases caused by Nontuberculous Mycobacteria (NTM) are increasingly detected in vulnerable groups. NTM's resistance to chlorine is up to 1000 times greater than that of E. Coli, allowing NTM to persist in water distribution systems. This study aims to analyze the concentration and species of NTM in household and Hospital X clean water, and to estimate the NTM exposure dose to vulnerable groups using the quantitative microbial risk assessment (QMRA) method. The research methods included bacterial enumeration using Middlebrook M7H10 media, electrophoresis, PCR, and Sanger sequencing. The average total concentration of NTM in households in Beji and Sukmajaya Districts, with PDAM and groundwater sources, was 14.7 CFU/L and 11.3 CFU/L, respectively. At X Hospital, the average concentration was 5.3 CFU/L. Two NTM species were found in 10 isolates (20%), namely Gordonia sp., Mycobacterium wolinskyi, and Mycolicibacterium mucogenicum in households, as well as Streptomyces sp. in X Hospital. The NTM exposure risk dose estimation using QMRA indicated an exposure dose in households of 0.00434 CFU and 0.00197 CFU in Hospital X. Although the NTM concentration was relatively low, measures to reduce NTM exposure, such as using filters and UV, changing disinfectant types, and reducing clean water stagnation, are necessary to mitigate health risks.