Analisis pseudomonas aeruginosa dan gen pengode resistensi terhadap antibiotika beta-laktam dan aminoglikosida dari sampel air limbah rumah sakit rujukan nasional = Analysis of pseudomonas aeruginosa and antibiotic resistance genes towards beta-lactam and aminoglycosides from wastewater samples of the national referral hospital

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Abstrak

Air limbah asal Rumah Sakit (HWW) dapat menjadi tempat reservoir dan sumber diseminasi bakteri resisten (ARB) dan gen pengode resistensi terhadap antibiotik (ARG) ke lingkungan. Penelitian ini bertujuan untuk menganalisis kelimpahan gen Pseudomonas aeruginosa sebagai bakteri patogen oportunis yang tahan di berbagai jenis lingkungan dan ARG terhadap beta-laktam dan aminoglikosida pada air limbah inlet dan outlet Rumah Sakit Rujukan Nasional. Sampel air limbah inlet dan outlet diambil pada durasi 25 Oktober-27 November 2021, dengan interval pengambilan 3 hari. Sampel air limbah kemudian difilter dan total DNA diekstraksi untuk dianalisis profil mikroba dan ARG menggunakan high thorough output qPCR sistem smartchip (HT-qPCR) dan qPCR konvensional. Data yang didapat berupa relative abundance, copy number, dan korelasi ARG dengan kuman target. Hasil penelitian menunjukkan bahwa gen aadA2 dan blaGES merupakan ARG tertinggi untuk antibiotik aminoglikosida dan -laktam. Hasil qPCR konvensional menunjukkan limit deteksi yang lebih rendah dalam mendeteksi gen P. aeruginosa dibandingkan HT-qPCR. Analisis statistik menunjukkan tidak ada korelasi antara gen aadA2 dan blaGES dengan gen P. aeruginosa dalam seluruh sampel. Dengan terdeteksinya gen kuman P. aeruginosa dan gen pengode resistensi antibiotik di sampel air limbah inlet dan outlet RS Rujukan Nasional mengindikasikan perlunya peningkatan penanganan HWW dalam mengontrol diseminasi dan kejadian resistensi mikroba terhadap antibiotik.
.....Hospital wastewater (HWW) can be the reservoir and dissemination source of antibiotic resistant bacteria (ARB) and antibiotic resistance genes (ARG) to the environment. This study intends to detect the Pseudomonas aeruginosa gene as opportunistic bacterial pathogen that is highly adaptive in various types of environments and ARG’s towards beta-lactam and aminoglycosides from inlet and outlet wastewater of The National Referral Hospital (NRH). Wastewater samples were taken on October 25th-November 27th, 2021, within 3 days interval. The wastewater sample was filtered and extracted to obtain DNA for microbial and ARGs profiles analysis using high thorough output qPCR smartchip systems (HT-qPCR) and conventional qPCR. Obtained data were relative abundance, copy number, and correlation of ARGs with targeted bacteria. The results showed that the aadA2 and blaGES genes were the highest ARGs towards aminoglycosides and -lactam. The conventional qPCR results showed lower detection limit in detecting P. aeruginosa gene than HT-qPCR. The statistical analysis showed that there were no correlation between aadA2 and blaGES genes with P. aeruginosa gene in all samples. The detection of P. aeruginosa gene and the ARG in NRH's inlet and outlet wastewater samples indicates the need to improve HWW treatment at NRH in controlling the dissemination.