Analisis prevalensi E. Coli resistan terhadap cefotaxime pada air tanah di Kota Metro Lampung = Analysis of the prevalence of E. Coli resistant to cefotaxime in groundwater in Metro Lampung City

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Abstrak

Keberadaan Antimicrobial Resistance (AMR) di lingkungan mengalami peningkatan seiring berjalannya waktu. AMR mulai ditemukan terkandung pada air tanah sebagai salah satu pencemar mikrobiologis. Kota Metro sebagai mayoritas pengguna air tanah dari sumur bor dan gali, yakni mencapai 90% perlu waspada terhadap keberadaan AMR. Penelitian ini bertujuan untuk menganalisis konsentrasi E. coli dan E. coli resistan terhadap cefotaxime serta rasio perbandingannya, menganalisis pengaruh faktor curah hujan, suhu, kelembaban, pH, total padatan terlarut, dan kekeruhan terhadap kadar konsentrasi, serta memberikan rekomendasi tindakan pengelolaan air tanah berdasarkan prevalensi bakteri E. coli dan E. coli resistan di Kota Metro. Penelitian ini dilakukan di 11 lokasi selama bulan November – Februari menggunakan IDEXX Colilert-18 dan Quanti-Tray/2000 untuk mendeteksi konsentrasi E. coli dan E. coli resistan melalui penggunaan antibiotik cefotaxime. Hasil penelitian menunjukkan sebanyak 67% air tanah mengandung E. coli dan sebanyak 27% di antaranya bersifat resistan terhadap cefotaxime. Persentase keberadaan (1) E. coli dan (2) E. coli resistan dengan kategori risiko sangat tinggi (>100 MPN/100 ml) mencapai (1) 24% dan (2) 0%; risiko tinggi (>10 – 100 MPN/100 ml) (1) 13% dan (2) 2%; risiko menengah (1 – 10 MPN/100 ml) (1) 31% dan (2) 16%; dan risiko rendah (<1 MPN/100 ml) (1) 33% dan (2) 82%. Peningkatan konsentrasi E. coli berkorelasi dengan faktor curah hujan, suhu, dan kekeruhan sedangkan peningkatan konsentrasi E. coli resistan berkorelasi dengan faktor curah hujan. Hubungan korelasi didapatkan melalui uji peringkat Spearman berdasarkan signifikansi (p-value) < 0,05. Berdasarkan hasil prevalensi, masyarakat dapat meminimalisasi konsentrasi dengan cara memodifikasi kondisi fisik sumur agar sesuai dengan standar yang telah ditetapkan oleh Kementerian PUPR dan SNI. Masyarakat juga dapat menggunakan filter sederhana, misalnya filter granular untuk memfiltrasi air sebelum digunakan. Walaupun langkah tersebut dilakukan, perlu diingat bahwa terdapat faktor pengaruh lain yang dapat memengaruhi konsentrasi E. coli dan E. coli resistan, salah satunya adalah kontaminan di sekitar sumur, seperti feses manusia, feses hewan ternak, dan sisa air buangan rumah tangga. Maka, peran pemerintah dalam penyediaan layanan fasilitas air bersih menjadi salah satu langkah untuk mengurangi penggunaan air tanah yang terkontaminasi.
.....The prevalence of Antimicrobial Resistance (AMR) in the environment has been increasing over time. AMR has been detected in groundwater as one of the microbiological pollutants. Metro City, where the majority relies on groundwater from boreholes and wells, accounting for 90%, must be vigilant against AMR. This study aims to analyze the concentration of E. coli and cefotaxime-resistant E. coli, along with their ratio, to analyze the influence of rainfall, temperature, humidity, pH, total dissolved solids, and turbidity on concentration levels, and to provide recommendations for groundwater management based on the prevalence of E. coli and cefotaxime-resistant E. coli in Metro City. The research was conducted at 11 locations from November to February using the IDEXX Colilert-18 and Quanti-Tray/2000 to detect the concentration of E. coli and cefotaxime-resistant E. coli through the use of antibiotics. The results showed that 67% of the groundwater contained E. coli, with 27% being resistant to cefotaxime. The percentage of

presence of (1) E. coli and (2) cefotaxime-resistant E. coli with very high-risk categories (>100 MPN/100 ml) reached (1) 24% and (2) 0%; high risk (>10 – 100 MPN/100 ml) (1) 13% and (2) 2%; moderate risk (1 – 10 MPN/100 ml) (1) 31% and (2) 16%; and low risk (<1 MPN/100 ml) (1) 33% and (2) 82%. The increase in E. coli concentration correlated with rainfall, temperature, and turbidity, while the increase in cefotaxime-resistant E. coli concentration correlated with rainfall. Correlation relationships were determined through Spearman rank tests based on significance (p- value) < 0.05. Based on the prevalence, the community can minimize concentrations by modifying the physical conditions of wells to meet the standards set by the Ministry of Public Works and SNI. The community can also use simple filters, such as granular filters, to filter water before use. Despite these measures, it should be noted that there are other influencing factors that can affect the concentration of E. coli and cefotaxime-resistant E. coli, such as contaminants around the well, such as human feces, livestock feces and household wastewater. Therefore, the government's role in providing clean water facilities becomes one of the steps to reduce the use of contaminated groundwater.