Penilaian Risiko Bakteri Escherichia coli Resisten terhadap Antibiotik di Wilayah Perkotaan = Risk Assessment of Antibiotic-Resistant Escherichia coli in Urban Area

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Abstrak

Resistensi terhadap antibiotik pada bakteri dan penyebarannya di lingkungan menjadi ancaman terhadap kesehatan masyarakat. Keberadaan bakteri resisten terhadap antibiotik dipicu oleh aktivitas antropogenik, salah satunya adalah penyalahgunaan antibiotik. Bakteri resisten terhadap antibiotik yang ditemukan di lingkungan domestik dapat menimbulkan risiko kesehatan pada warga setempat. Penelitian ini dilakukan untuk mengetahui konsentrasi bakteri E. coli resisten di lingkungan domestik di Kota Bekasi, menilai risiko kesehatan yang ditimbulkan akibat paparan mikroorganisme, dan mengidentifikasi rute paparan bakteri E. coli resisten terhadap antibiotik ke manusia. Identifikasi konsentrasi bakteri E. coli resisten terhadap antibiotik menggunakan kultur bakteri dan penilaian risiko dilakukan menggunakan metode Quantitative Microbial Risk Assessment (QMRA). Hasil penelitian menunjukkan rata-rata konsentrasi bakteri E. coli resisten terhadap antibiotik (n=3) di tanah sebesar 1,28 105 CFU/mL, air sungai sebesar 3,9 101 CFU/mL, tangki septik sebesar 8,06 102 CFU/mL, feses ayam sebesar 1,33 106 CFU/mL, sedangkan di air tanah tidak ditemukan keberadaan E. coli resisten terhadap antibiotik. Penilaian risiko dengan metode QMRA pada bakteri E. coli resisten terhadap antibiotik dilakukan pada galur E. coli O157:H7 sebagai galur yang paling umum menyebabkan penyakit diare pada manusia. Probabilitas infeksi harian (Pinf,d) yang disebabkan oleh bakteri E. coli O157:H7 di tanah berkisar antara 33,37% - 36,99% sesuai kelompok usia dengan probabilitas infeksi tahunan (Pinf,a) 100% dengan probabilitas munculnya penyakit (Pill) sebesar 25%. Sementara itu, probabilitas infeksi harian (Pinf,d) yang disebabkan oleh bakteri E. coli O157:H7 di air sungai berkisar antara 4,88% - 14,28% dengan probabilitas infeksi tahunan (Pinf,a) 99% - 100% dan probabilitas munculnya penyakit (Pill) adalah 24,9% - 25% tergantung jenis ingestinya. Berdasarkan penilaian risiko tersebut, rute paparan bakteri E. coli resisten terhadap antibiotik ke manusia melalui media tanah dan air sungai, sehingga pencegahan dapat dilakukan untuk menangani risiko kesehatan pada manusia seperti meminimalisir penggunaan air sungai untuk aktivitas domestik, peningkatan fasilitas sanitasi, dan penerapan teknologi atau metode pencegahan resistensi terhadap antibiotik.
.....The occurrence of antibiotic-resistant bacteria in the environment is a threat to public health. The spread of antibiotic-resistant bacteria in the environment is influenced by anthropogenic activities, such as antibiotic misuse. Antibiotic-resistant bacteria found in the domestic environment pose a health risk to inhabitants. This study aims to identify antibiotic-resistant E. coli concentration in a domestic environment in Bekasi City, assess public health risks associated with exposure to pathogenic bacteria, and identify the exposure route of antibiotic-resistant E. coli to humans. The bacterial culture method was used to identify the concentration of antibiotic-resistant E. coli and the risk assessment was carried out using Quantitative Microbial Risk Assessment (QMRA). The results showed the average concentration of antibiotic-resistant E. coli (n=3) found in soil was 1,28 105 CFU/mL, in river water was 3,9 101 CFU/mL, in septic tank effluent was 8,06 102 CFU/mL, chicken feces was 1,33 106 CFU/mL, and none found in groundwater. Risk assessment was carried out using QMRA on E. coli O157:H7 strain as the most common strain to cause

diarrheal illness in humans. The daily probability of infection (Pinf,d) caused by E. coli O157:H7 in soil ranged from 33,37% - 36,99% according to the age group with an annual probability of infection of 100% and the probability of illness obtained was 25%. Furthermore, the daily probability of infection caused by E. coli O157:H7 in river ranging from 4,88% - 14,28% with annual probability of infection (Pinf,a) ranged from 99% - 100% depending on the types of ingestion with the probability of illness obtained ranged from 24,9% - 25%. Based on the risk assessment, the exposure route of antibiotic-resistant E. coli can be determined by involving human, animal, and environmental sectors. Routes help to identify prominent exposure pathways in posing health risks to humans. The study revealed the route of antibiotic-resistant E. coli contamination to humans through environmental matrices, such as soil and river. Therefore, prevention can be done in order to deal with human health risks, such as reducing domestic uses of river water for communities, improving sanitation facility, and the application of technology and prevention methods to combat antibiotic resistance.