

Potensi Bakteri Indigen Penghasil Enzim Protease dan Lipase sebagai Agen Bioremediasi Limbah Biomedis Puskesmas Tlogosari Kulon

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ABSTRAK

Jumlah Puskesmas di Provinsi Jawa Tengah terus mengalami peningkatan dalam kurun 2012 – 2016 dan berpotensi meningkatkan kuantitas limbah biomedis cair yang dihasilkan. Kemampuan Puskesmas dalam mengelola limbahnya masih belum memadai karena mahalnya biaya operasional IPAL. Polutan organik dari limbah biomedis cair umumnya masih dikelola menggunakan sistem non-bioremediasi sehingga tidak sepenuhnya ramah lingkungan. Penggunaan bakteri indigen pendegradasi bahan organik dengan tingkat patogenitas rendah hingga nonpatogen merupakan upaya untuk mengurangi polutan limbah biomedis cair melalui bioremediasi. Bakteri berkemampuan bioremediasi akan mendegredasikan polutan kompleks menjadi molekul yang tidak berbahaya atau beracun. Penelitian ini bertujuan mengisolasi bakteri indigen nonpatogen atau berpatogenitas rendah penghasil enzim protease dan lipase untuk digunakan sebagai agen bioremediasi limbah biomedis cair Puskesmas Tlogosari Kulon. Sampel bakteri dari limbah biomedis cair di Puskesmas Tlogosari Kulon diisolasi dan koloninya dipurifikasi dengan media *Nutrient Agar* (NA). Uji patogenitas bakteri dilakukan pada media MacConkey dan *Blood Agar Plate* (BAP), sedangkan uji penghasilan enzim hidrolitik dilakukan dengan media *Skim Milk Agar* (SMA) dan *Tributyrin Agar*. Dari hasil penelitian ini diperoleh 6 isolat bakteri hasil purifikasi koloni yaitu T1, T2, T3, T4, T5, dan T6. Hasil uji patogenitas menunjukkan 3 isolat yaitu T2, T3 dan T5 memiliki tingkat patogenitas rendah. Sedangkan hasil uji penghasilan enzim menunjukkan satu isolat yaitu T3 mampu menghasilkan enzim protease dan lipase sekaligus. Dengan demikian isolat T3 berpotensi untuk dijadikan sebagai agen bioremediasi karena memiliki karakteristik: merupakan bakteri indigen limbah dengan tingkat patogenitas rendah dan mampu menghasilkan enzim pendegradasi bahan organik sebagai bahan utama limbah biomedis cair.

Kata Kunci : Limbah biomedis Puskesmas, Bioremediasi limbah biomedis, Bakteri hidrolitik, Puskesmas Tlogosari Kulon

Potential of Indigenous Bacteria Producing Protease and Lipase Enzymes as Bioremediation Agents of Biomedical Waste of Puskesmas Tlogosari Kulon

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ABSTRACT

The number of Puskesmas in Central Java Province had increased during 2012 - 2016 and has the potential to increase the quantity of liquid biomedical waste produced. The ability of puskesmas to manage their waste is still inadequate due to the high operational costs of the WWTP (Waterwaste Treatment Plant). Organic pollutants from liquid biomedical waste are generally managed using a non-biemediation systems, which are not fully environmentally friendly. The use of indigenous bacteria that could degrade organic matter with low pathogenicity to nonpathogenic levels is a way to reduce liquid biomedical waste pollutants through bioremediation. Bacteria capable of bioremediation will transform complex pollutants into harmless or toxic molecules. This study aims to isolate low-pathogenicity or non-pathogenic indigenous bacteria producing protease and lipase enzymes to be used as a bioremediation agent for liquid biomedical waste at the Tlogosari Kulon Health Center. Bacterial samples from liquid biomedical waste at the Tlogosari Kulon Health Center were isolated and the colonies were purified using Nutrient Agar (NA) media. Bacterial pathogenicity tests were carried out on MacConkey Agar (MC Agar) and Blood Agar Plate (BAP) media, while hydrolytic enzyme income testing was carried out on Skim Milk Agar (SMA) and Tributyrin Agar media. From this study 6 bacterial isolates resulting from purification of colonies namely T1, T2, T3, T4, T5, and T6 were obtained. Pathogenicity test results showed that 3 isolates namely T2, T3 and T5 had a low level of pathogenicity. Results of enzyme production tests showed that an isolate, T3, was able to produce protease and lipase enzymes at once. Thus the T3 isolate has the potential to be used as a bioremediation agent because for its characteristics: Indigenous bacteria with low pathogenicity and capable of producing enzymes which could degrade organic matter as the main ingredient of biomedical waste.

Keywords: Biomedical Waste of Puskesmas, Biomedical Waste Bioremediation, Hydrolytic Bacteria, Puskesmas Tlogosari Kulon.