

Aktivitas antibakteri dari partikel nano ZnO terhadap Escherichia coli NBRC 3301 = Antibacterial activity of ZnO nanoparticles against Escherichia coli NBRC 3301

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Abstrak

Penelitian bertujuan menguji kemampuan aktivitas antibakteri dari partikel nano ZnO terhadap Escherichia coli NBRC 3301. Aktivitas antibakteri dievaluasi dengan cara menentukan konsentrasi minimum bakterisidal, menentukan laju sintas, dan mengukur serta mengamati dampak aktivitas yang diakibatkan oleh partikel nano ZnO. Konsentrasi minimum bakterisidal partikel nano ZnO terhadap E. coli NBRC 3301 adalah 0,2%. Aktivitas antibakteri meningkat seiring meningkatnya lama paparan. Setelah terpapar selama 20 jam, sel mengalami penurunan jumlah hingga 103 CFU/ml dan mengalami kematian 100% pada jam ke-24. Dampak aktivitas tersebut ditandai dengan meningkatnya kadar asam nukleat dan terjadinya perbedaan komposisi total protein pada medium pertumbuhan berdasarkan perbedaan pola spektrogram dan kromatogram. Meskipun pengamatan perubahan morfologi sel menggunakan SEM tidak berhasil, hasil-hasil tersebut memperkuat kemungkinan bahwa partikel nano ZnO menyebabkan kerusakan membran sel sehingga terjadi kebocoran sitoplasma yang berakibat pada kematian sel.

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This present work examines antibacterial activity of ZnO Nanoparticles (NPs) against Escherichia coli NBRC 3301. Antibacterial activity was evaluated by determining the minimum bactericidal concentration (MBC) and measuring death rate. The impacts of the activity of ZnO NPs were also measured and observed. The MBC was determined to be 0.2%. The antibacterial activity increased with increasing exposure time. Bacteria cell number was reduced until 103 CFU/ml after exposure to 0.2% of ZnO NPs for 20 hours. 100% of total cell death was observed after 24 hours application of ZnO NPs. The impact of ZnO NPs on cells was indicated by increase in the amount of nucleic acid and change in total protein composition in growth medium based on the pattern differences of spectrogram and chromatogram. Despite morphological changes was not well observed by SEM image, the results reveal that ZnO NPs could damage cell membrane and lead to leakage of cytoplasm which is kill bacterial cells.