Evaluasi Efektivitas Paparan Cahaya Lampu UVC Komersial terhadap Viabilitas Mikroorganisme di Udara = Evaluation of Effectiveness of Commercial UVC Light Exposure towards Air Microorganism Viability

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Abstrak

Bioaerosol merupakan partikulat biologis yang mengudara dan berpotensi menularkan penyakit jika mengandung agen patogenik. Karena ukurannya yang relatif kecil, bioaerosol dapat dengan mudah tersuspensi di udara dan mudah terdispersi hingga terhirup oleh makhluk hidup. Radiasi ultraviolet (UV), terutama spektrum UVC dengan kisaran gelombang 200-280 nm bersifat letal karena menghambat pertumbuhan mikroorganisme. Pemanfaatan radiasi UVC menjadi metode alternatif untuk membantu membatasi transmisi bioaerosol dari individu satu ke individu lain dalam ruang tertutup dengan mengurangi konsentrasi mikroorganisme patogenik di udara. Penelitian bertujuan untuk mengetahui dan mengevaluasi tingkat efektivitas germisida cahaya UVC dari perangkat UVC komersial. Penelitian dilakukan dengan 3 tahapan utama: menguji efek germisida secara kualitatif dengan metode pemaparan langsung; menguji efek germisida secara kuantitatif dengan metode total plate count (TPC); dan evaluasi efek germisida dengan aplikasi pada ruang menggunakan metode settle plate. Hasil data kuantitatif diperoleh melalui pengamatan visual terhadap pertambahan jumlah koloni mikroorganisme sampling. Hasil penelitian menunjukkan bahwa radiasi UVC memberikan pengaruh nyata dalam mereduksi jumlah koloni uji yang tumbuh dan total populasi mikroorganisme udara ruang bila dibandingkan dengan koloni kontrol. Penelitian menunjukkan bahwa iradiasi UVC secara langsung dengan jarak 2 meter efektif menghambat pertumbuhan mikroorganisme hingga 99,9%.

.....Bioaerosols are biological particulates that settle in the air and have the potential to transmit disease if they contain pathogenic agents. Due to their relatively small size, bioaerosols can easily be suspended in the air and easily dispersed until they are inhaled by living things. Ultraviolet radiation (UV), especially the UVC spectrum with a wave range of 200-280 nm is lethal because it inhibits the growth of microorganisms. Utilization of UVC radiation is considered as an alternative method to help limiting the transmission of bioaerosols from one individual to another in closed spaces by reducing the concentration of pathogenic microbes in the air. The aim of this study was to determine and evaluate the effectiveness of UVC light germicides from commercial UVC devices. The research was carried out in 3 main stages: qualitatively testing the effects of germicides using the direct exposure method; to test the germicidal effect quantitatively using the total plate count (TPC) method; and evaluation of the germicidal effect by application to room space using the settle plate method. The results of the data were obtained through visual observation of the increase in number of sampling microorganism colonies. The results showed that UVC radiation had a significant effect in reducing the number of growing test colonies and the total population of room air microorganisms when compared to control colonies. Research shows that direct UVC irradiation with a distance of 2 meters effectively inhibits the growth of microorganisms up to 99.9%.