

Pengaruh Iradiasi Gamma Terhadap Kandungan Kuersetin dan Khasiatnya pada Ekstrak Etanol Bunga Rosela (*Hibiscus sabdariffa* L.) = The Effect of Gamma Irradiation on Quercetin and Efficacy in Ethanol Extract of Roselle (*Hibiscus sabdariffa* L.)

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Abstrak

Iradiasi gamma banyak digunakan oleh beberapa industri obat herbal sebagai metode pengawetan yang efisien dalam mengurangi kontaminasi mikroorganisme. Tujuan dari penelitian ini adalah untuk mengevaluasi pengaruh iradiasi gamma (0; 5; 7.5; and 10 kGy) pada ekstrak etanol *H. sabdariffa* (EEHS) terhadap uji total mikroorganisme, total kandungan fenol dan flavonoid, aktivitas antioksidan, TLC profiling, total kuersetin dan bobot molekul, aktivitas penghambatan terhadap enzim -glukosidase dan in-vitro analisis terhadap galur sel kanker manusia (A-549, HUT-78, dan MCF-7). Iradiasi dosis 5 kGy menunjukkan bahwa tidak adanya kapang yang tumbuh dan terjadi penurunan jumlah total bakteri, lebih lanjut iradiasi pada dosis 10 kGy tidak terjadi pertumbuhan bakteri. Analisis total fenol, dan flavonoid, serta aktivitas antioksidan menunjukkan adanya penurunan sebesar 5-11% setelah diiradiasi pada dosis 5 kGy. Analisis profil TLC dan HPLC menunjukkan bahwa salah satu senyawa dalam EEHS adalah kuersetin yang ditunjukkan dengan adanya [M+H]⁺ pada m/z 303,04 dari hasil analisis LC-MS/MS. EEHS juga memiliki penghambatan terhadap aktivitas enzim -glukosidase dengan nilai penghambatan 4,75-7,55%. Uji aktivitas anti kanker terhadap galur sel kanker manusia menunjukkan bahwa EEHS memiliki kemampuan menghambat sel kanker sangat kuat dengan nilai IC₅₀ < 20 µg/mL. Lebih lanjut, khasiat anti kanker paling kuat terhadap HUT-78, dengan nilai IC₅₀ 10,51 µg/mL, diikuti terhadap MCF-7 (IC₅₀ 13,39 µg/mL), dan A-549 (IC₅₀ 14,19 µg/mL). Diketahui pula bahwa iradiasi dosis 5-10 kGy mampu menurunkan aktivitas anti kanker, namun penurunan tersebut tidak menghilangkan aktivitasnya yang ditandai nilai IC₅₀ < 20 µg/mL. Berdasarkan data yang diperoleh, dapat disimpulkan bahwa iradiasi gamma dapat digunakan sebagai pengawetan pada ekstrak etanol *H. sabdariffa* Linn.

.....Gamma irradiation is widely used by many herbal medicine industries as an efficient preservative method in reducing microorganism contamination. The purpose of this study was to evaluate the effect of gamma irradiation (0; 5; 7.5; and 10 kGy) on the ethanol extract of *H. sabdariffa* (EEHS) toward the total microorganism test, total phenol and flavonoid contents, antioxidant activity, TLC profile, total quercetin and its molecular weight, inhibitory activity against -glucosidase enzyme, as well as in-vitro bioassay against human cancer cell lines (A-549, HUT-78, and MCF-7). Irradiation at a dose of 5 kGy showed that no mold grew and there was a decrease in the total number of bacteria, moreover at a dose of 10 kGy there was no bacterial growth. Analysis of total phenols and flavonoids, as well as antioxidant activity showed a decrease of 5-11% after irradiation at a dose of 5 kGy. TLC and HPLC profile analysis showed that one of the compounds in the *H. sabdariffa* extract was quercetin which was indicated by the presence of [M+H]⁺ at m/z = 303.04 from the LC-MS/MS analysis. EEHS also had inhibitory activity against -glucosidase enzyme with the inhibition value of 4.75-7.55%. Bioassay anticancer against human cancer cell lines showed that EEHS had a very strong ability to inhibit cancer cells with the IC₅₀ value < 21 µg/mL. Furthermore, the anti-cancer properties were strongest against HUT-78 with the IC₅₀ value of 10.51 µg/mL, followed by MCF-7

(IC50 13.39 $\mu\text{g}/\text{mL}$), and A-549 (IC50 14.19 $\mu\text{g}/\text{mL}$). It is also known that irradiation doses of 5-10 kGy could reduce anti-cancer activity, however the decrease did not eliminate its activity which was the IC50 values still lower than 20 $\mu\text{g}/\text{mL}$. Based on the data obtained, it can be concluded that gamma irradiation can be used as a preservative method for ethanol extract of *H. sabdariffa* Linn.