INTISARI

Doksorubisin dapat meningkatkan ROS intraseluler yang merusak sel ginjal melalui induksi penuaan sel. Minyak serai wangi (MSW) (*Cymbopogon nardus* (L.) Rendl.) maupun kandungan senyawanya diketahui memiliki aktivitas antioksidan, sehingga berpotensi digunakan sebagai agen pelindung ginjal akibat penuaan seluler. Penelitian ini bertujuan untuk menelusuri efek nefroprotektif MSW terhadap penuaan seluler akibat induksi doksorubisin melalui pendekatan bioinformatika dan *in vitro*. MSW diperoleh menggunakan distilasi uap air. Profil fitokimianya didapatkan melalui analisis GC-MS. MSW mengandung senyawa sitral (15,61%), sitronelal (14,92%), metil eugenol (12,55%), hedikaryol (9,08%), sitronelol (8,44%), geraniol (8,18%), dan geranil asetat (3,27%). Studi bioinformatika dilakukan untuk mengetahui gen yang mengalami upregulasi pada kejadian nefrotoksik akibat induksi doksorubisin dan menjadi target senyawa dalam MSW. Sebanyak 28 gen berperan pada respon seluler terhadap stres kimiawi oksidatif. PTGS2 merupakan gen yang berperan pada proses inflamasi dan kerusakan jaringan akibat induksi doksorubisin dan menjadi target paling potensial MSW. Uji sitotoksik dilakukan menggunakan metode *trypan blue exclusion* pada sel Vero sebagai model sel normal ginjal. MSW bersifat sitotoksik lemah dengan nilai IC_{50} sebesar 139 μg/mL. Uji *SA-β-Gal assay* dilakukan untuk mengetahui efek MSW terhadap *marker* penuaan seluler. MSW mampu menurunkan persentase sel Vero yang mengalami penuaan seluler akibat induksi doksorubisin secara signifikan ($p<0,001$). Oleh karena itu, MSW berpotensi digunakan sebagai agen nefroprotektif pada penuaan seluler akibat induksi doksorubisin.

Kata kunci: serai wangi, nefroprotektif, bioinformatika, sel Vero

ABSTRACT

Doxorubicin can increase intracellular ROS that damage kidney cells through induction of cell senescence. Citronella oil (CO) (*Cymbopogon nardus* (L.) Rendl.) and its compounds are known to have antioxidant activity, so they have the potential to be used as kidney protective agents due to cellular senescence. This study aimed to investigate the nephroprotective effect of CO on cellular senescence induced by doxorubicin through bioinformatics and in vitro approaches. CO was obtained using steam distillation. The phytochemical profile was obtained through GC-MS analysis. CO contains citral (15.61%), citronellal (14.92%), methyleugenol (12.55%), hedycaryol (9.08%), citronellol (8.44%), geraniol (8.18%) , and geranyl acetate (3.27%). A bioinformatics study was conducted to determine which genes were upregulated in the incidence of nephrotoxicity due to doxorubicin induction and became the target of compounds in CO. A total of 28 genes play a role in the cellular response to oxidative chemical stress. PTGS2 is a gene that plays a role in the inflammatory process and tissue damage due to doxorubicin induction and is the most potential target for CO. Cytotoxic test was performed using the trypan blue exclusion method on Vero cells as a normal kidney cell model. CO is weakly cytotoxic with an IC_{50} value of 139 μg/mL. The SA-β-Gal assay was performed to determine the effect of CO on cellular senescence markers. CO was able to significantly reduce the percentage of Vero cells that experienced cellular senescence due to doxorubicin induction ($p<0.001$). Therefore, CO has the potential to be used as a nephroprotective agent in doxorubicin-induced cellular senescence.

Keywords: citronella, nephroprotective, bioinformatics, Vero cell