INTISARI

Doksorubisin, kemoterapi lini pertama untuk kanker payudara, memiliki keterbatasan karena risiko efek samping. Lengkuas (*Alpinia galanga* L.) terbukti memiliki efek ganda sebagai agen kombinasi doksorubisin yang meningkatkan potensinya pada kanker payudara dan mengurangi efek sampingya pada fibroblas normal. Namun mekanisme efek ganda tersebut belum diketahui sehingga penelitian ini berfokus untuk mengeksplorasinya.

Studi berbasis bioinformatika ekspresi gen target kanker payudara dilakukan untuk memperoleh target potensial. Model inhibisi target potensial dibuat dengan menggunakan *machine learning* dan dilakuakn analisis inhibisi target potensial oleh metabolit sekunder lengkuas. Analisis target prediktif kanker payudara dilakukan setelah didapatkan metabolit sekunder potensial.

Target potensial pada kanker payudara adalah *glyoxalase* I (GLO1) dan model penghambatan diperoleh dengan algoritma *XGBoost Linear*. Galangin sebagai metabolit sekunder lengkuas menunjukkan potensi efek ganda dengan menghambat GLO1 pada kanker payudara dan pada fibroblas normal terbukti menghambat sitokrom P450. Galangin juga menargetkan modulator siklus sel dan migrasi sel pada kanker payudara. Secara keseluruhan, penelitian ini menunjukkan bahwa lengkuas meningkatkan potensi doksorubisin melalui galangin dengan meningkatkan ROS, senesen, penghentian siklus sel, dan anti migrasi pada sel kanker sedangkan pada sel normal mencegah peningkatan ROS dan penuaan.

Kata kunci: *Alpinia galanga* L., Bioinformatika, Doksorubisin, Efek ganda, Kanker payudara.

ABSTRACT

Doxorubicin, the first-line chemotherapy for breast cancer, has limitations due to the risk of side effects. Galangal (Alpinia galanga L.) has been shown to have a dual effect as a doxorubicin combination agent which increases its potency in breast cancer and counter-act doxorubicin side effect in normal fibroblast. However, the dual effect mechanism is not known so this research focuses on exploring it.

A bioinformatics-based study was conducted in breast cancer targets expression to obtain potential target. Then, a potential target inhibition model was created using machine learning and then analysis of the inhibition of potential target by galangal secondary metabolites was conducted. Predictive target analysis of breast cancer was carried out after potential secondary metabolite was obtained.

The potential target in breast cancer is glyoxalase I (GLO1) and the inhibition model obtained by XGBoost Linear algorithm. Galangin exhibits a potential dual effect as a secondary metabolite of galangal by inhibiting GLO1 in breast cancer and in normal fibroblasts shown to inhibit cytochrome p 450. Galangin also targets modulator of the cell cycle and cell migration in breast cancer. Overall, this study showed that galangal increases the potency of doxorubicin through galangin by increasing ROS, senescence, cell cycle arrest, and anti-migration in cancer cells while in normal cells prevents increased ROS and senescence.

Keywords: Alpinia galanga L., Bioinformatics, Doxorubicin, Dual effects, Breast cancer.