

ABSTRAK

SINTESIS, KARAKTERISASI, DAN UJI AKTIVITAS ANTIPROLIFERASI SENYAWA TRIFENILTIMAH(IV) 3- NITROBENZOAT DAN TRIFENILTIMAH(IV) 4-NITROBENZOAT TERHADAP SEL KANKER PARU-PARU A549

Oleh

Nabila Furqona Safaish

Kanker paru-paru tipe *non-small cell lung cancer* (NSCLC) merupakan penyebab utama kematian akibat kanker di dunia. Pengobatan seperti kemoterapi dapat menimbulkan efek samping dan keterbatasan efektivitas. Oleh karena itu, diperlukan agen antikanker baru yang lebih selektif dan efektif. Organotimah(IV) diidentifikasi sebagai agen terapeutik aktif secara biologis. Penelitian ini bertujuan untuk mengetahui aktivitas antiproliferasi senyawa trifeniltimah(IV) 3-nitrobenzoat dan trifeniltimah(IV) 4-nitrobenzoat terhadap sel kanker paru-paru A549.

Sintesis senyawa dilakukan dengan metode refluks selama 4 jam pada suhu 60–61°C dalam pelarut metanol *p.a.* Hasil sintesis diperoleh serbuk padatan kering berwarna putih tulang dengan rendemen masing-masing sebesar 90,90% dan 92,37%. Senyawa hasil sintesis kemudian dikarakterisasi dengan spektrofotometer UV-Vis dan FT-IR, spektrometer ¹H-NMR dan ¹³C-NMR, serta *microelemental analyzer*. Hasil karakterisasi menunjukkan bahwa trifeniltimah(IV) 3-nitrobenzoat dan trifeniltimah(IV) 4-nitrobenzoat terbentuk dengan kemurnian tinggi.

Kedua senyawa diuji aktivitas antiproliferasinya terhadap sel kanker paru-paru A549 dan sel normal Vero dengan metode *in vitro* dan *direct counting* menggunakan *trypan blue*. Hasil uji diperoleh bahwa trifeniltimah(IV) 3-nitrobenzoat bersifat aktif dengan nilai IC₅₀ 6,19 µg/mL, dan trifeniltimah(IV) 4-nitrobenzoat bersifat sangat aktif dengan IC₅₀ 2,50 µg/mL. Nilai indeks selektivitas masing-masing sebesar 15,80 dan 34,05 yang menunjukkan bahwa kedua senyawa memiliki selektivitas tinggi dan berpotensi sebagai antikanker.

Kata kunci: trifeniltimah(IV) 3-nitrobenzoat, trifeniltimah(IV) 4-nitrobenzoat, antiproliferasi, *non-small cell lung cancer*, kanker paru-paru A549.

ABSTRACT

SYNTHESIS, CHARACTERIZATION, AND ANTIPROLIFERATIVE ACTIVITY TEST OF TRIPHENYLTIN(IV) 3-NITROBENZOATE AND TRIPHENYLTIN(IV) 4-NITROBENZOATE AGAINST A549 LUNG CANCER CELLS

By

Nabila Furqona Safaish

Lung cancer of the non-small cell lung cancer (NSCLC) type is a major cause of cancer-related mortality worldwide. Treatments such as chemotherapy can cause side effects and have limitations in effectiveness. Therefore, new anticancer agents that are more selective and effective are needed. Organotin(IV) compounds have been identified as biologically active therapeutic agents. This study aims to determine the antiproliferative activity of triphenyltin(IV) 3-nitrobenzoate and triphenyltin(IV) 4-nitrobenzoate against A549 lung cancer cells.

The synthesis of the compounds was carried out using a reflux method for 4 hours at a temperature of 60–61°C in methanol p.a. as the solvent. The synthesis results were obtained as bone white dry solid powder with yields of 90.90% and 92.37%, respectively. The synthesized compounds were then characterized using UV-Vis and FT-IR spectrophotometry, ¹H-NMR and ¹³C-NMR spectrometer, and a microelemental analyzer. The characterization results showed that triphenyltin(IV) 3-nitrobenzoate and triphenyltin(IV) 4-nitrobenzoate were formed with high purity.

Both compounds were tested for their antiproliferative activity against A549 lung cancer cells and normal Vero cells using an in vitro method and direct counting with trypan blue. The test results showed that triphenyltin(IV) 3-nitrobenzoate is active with an IC₅₀ value of 6.19 µg/mL, and triphenyltin(IV) 4-nitrobenzoate is very active with an IC₅₀ value of 2.50 µg/mL. The selectivity index values of 15.80 and 34.05, respectively, indicate that both compounds have high selectivity and potential as anticancer agents.

Keywords: triphenyltin(IV) 3-nitrobenzoate, triphenyltin(IV) 4-nitrobenzoate, antiproliferative, non-small cell lung cancer, A549 lung cancer.