ABSTRACT

Oxidative stress can be a major risk factor to many detrimental effects on human health, such as accelerated aging, faster cancer progression, and the development of many diseases. Many types of therapeutic agents have been formulated and derived to generate antioxidant effects, one of which is curcumin analogs. Also, the insertion of methoxy (-OCH_3) and thioether (R-S-R) are proved to be related to the antioxidant capacity of those analogs. This research aims to synthesize curcumin analog 2,6-bis-(3′,4′,5′-trimethoxybenzylidene)-thiopyran-4-one and review its antioxidant activity.

Synthesis of 2,6-bis-(3′,4′,5′-trimethoxybenzylidene)-thiopyran-4-one was conducted with aldol condensation reaction using 3,4,5-trimethoxybenzaldehyde and tetrahydro-4H-thiopyran-4-one as starting materials. The reaction was mediated at 60 ± 2 °C with concentrated HCl as the catalyst and glacial acetic acid as solvent. Work up process was carried out using aquadest, while recrystallization was carried out with dichloromethane (DCM)-hexane. A purity test was conducted using a melting point assay and three eluents thin layer chromatography (TLC) test. Structure elucidation was determined with infrared spectroscopy (FTIR), mass spectrometry (GC-MS), and nuclear magnetic resonance spectroscopy (^{1}H-NMR and ^{13}C-NMR). Expected antioxidant activity was presumed and reviewed using a narrative review approach.

The result obtained was compound 2,6-bis-(3′,4′,5′-trimethoxybenzy-lidene)-thiopyran-4-one in the form of greenish-yellow crystals with yield equal to 57%. Compound 2,6-bis-(3′,4′,5′-trimethoxybenzy-lidene)-thiopyran-4-one melted between 225.4 – 226.4 °C and emitted a single spot in every mobile phase of three eluents TLC test, indicating that the synthesized compound was pure. Structure elucidation analysis confirmed that the structure of 2,6-bis-(3′,4′,5′-trimethoxybenzylidene)-thiopyran-4-one was as predicted. Antioxidant activity review indicated that 2,6-bis-(3′,4′,5′-trimethoxybenzylidene)-thiopyran-4-one has a good potential to become an antioxidant compound that is supported by hydrogen in the α,β-unsaturated bonds as 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenger and central ketone group as the electron donor in reducing ferric ion. Antioxidant activity of 2,6-bis-(3′,4′,5′-trimethoxybenzylidene)-thiopyran-4-one is also reinforced by methoxy groups as electron cloud densifier in the aromatic ring and thioether group as a secondary antioxidant.

Keywords:
synthesis, antioxidant, curcumin analog, 2,6-bis-(3′,4′,5′-trimethoxybenzy-lidene)-thiopyran-4-one