ABSTRACT

The quality of herbal products heavily relies on the consistent measurement of chemical parameters such as *Total Phenolic Content* (TPC), *Total Flavonoid Content* (TFC), and antioxidant activity. To date, there is no universal standard for selecting reference compounds, which complicates the comparison of TPC and TFC results across laboratories. This study aims to develop bidirectional conversion formulas between reference standards for TPC and TFC calibration to address the inconsistency in analytical results. Five Indonesian medicinal plant species were analyzed using seven phenolic and five flavonoid standards with UV-Vis spectrophotometry. Antioxidant activity was evaluated using the DPPH method to assess the relationship between bioactive compound content and biological activity.

The study began with ethanol extraction of five medicinal plant species (Phyllanthus urinaria, *Blumea balsamifera*, *Oldenlandia corymbosa*, *Syzygium polyanthum*, and *Amaranthus spinosus*) via maceration, followed by characterization and phytochemical screening. TPC was analyzed using the Folin–Ciocalteu reagent, while TFC was determined through complexation with $AlCl_3$. Measurements were conducted using UV-Vis spectrophotometry based on calibration curves of seven phenolic and five flavonoid standards. Conversion formulas between standards were developed using linear regression and validated by comparing the converted values with experimental data. Antioxidant activity was measured using the DPPH method and correlated with TPC and TFC values.

The study successfully established calibration curves for TPC and TFC analysis from various reference standards with high linearity ($R^2 > 0.99$). Conversion formulas were successfully developed, where only TPC as catechin equivalents could be reliably applied, while all TFC conversions were applicable across the five plant extracts. The correlation between TPC and IC_{50} values showed a very strong relationship ($R > 0.90$), whereas the correlation between TFC and IC_{50} showed a strong correlation ($0.70 > R > 0.80$). These findings suggest that phenolic compounds have a more dominant influence on antioxidant activity.

Keywords: total phenolc content total flavonoid content, conversion formula, antioxidant activity