

Phytochemical diversity and biological activities of *Curcuma* species from the East Coast of Peninsular Malaysia

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Abstract. *Yurasbe NQ, Din NA, Palaniveloo K, Manikam S, Nagappan T. 2023. Phytochemical diversity and biological activities of Curcuma species from the East Coast of Peninsular Malaysia. Biodiversitas 24: 4243-4252.* Zingiberaceae has been associated with traditional medicine for centuries. The genus *Curcuma* is traditionally famous and economically important for its therapeutic and nutritional values. Over 50 genera of 1600 species are recorded worldwide, with the highest concentration in the Malaysian region, including Indonesia, Borneo, Thailand, Malaysia, Vietnam, Cambodia, Myanmar, and the Philippines. We investigated the methanolic crude extracts of *Curcuma aeruginosa*, *Curcuma caesia*, *Curcuma longa*, *Curcuma xanthorrhiza*, and *Curcuma zedoaria* from Terengganu for their phytochemicals, total phenolic content (TPC) using Folin-Ciocalteu colorimetric method, total flavonoid content (TFC) using aluminum chloride colorimetric method, antioxidant activity using the 2,2-diphenyl-1-picryl-hydrezy (DPPH) radical scavenging activity and toxicity using brine shrimp lethality test (BSLT). Phytochemical screening revealed alkaloids, flavonoids, phenolics, saponins, tannins, triterpenoids, glycosides, lignins, and oils in all species investigated. *Curcuma longa* extract had the highest phenolic and flavonoid content with the value of 155.31±1.78 mg GAE/g and 151±8.35 mg quercetin/g, respectively as well as best antioxidative potential with IC50 value of 88.65±0.6 µg/mL, followed by *C. zedoaria* (98.61±5.23 µg/mL), *C. aeruginosa* (142.51±3.29 µg/mL), *C. xanthorrhiza* (150.01±0.63 µg/mL) and *C. caesia* (156.4±0.67 µg/mL). *Curcuma caesia* displays the lowest degree of toxicity compared to the other species, with the LC50 value of 11585 µg/mL) considered non-cytotoxic. Hence, the selected *Curcuma* species has potential therapeutic value to be developed into pharmaceutical due to its significant bioactive potentials and potent antioxidant capacity.

Keywords: BSLT, *Curcuma*, DPPH, flavonoid content, phenolic content

INTRODUCTION

Since prehistoric times, humans have relied on plants for survival, food sources, and treatment for various ailments. Using herbs and spices as treatments for various ailments dates back 4,000 years. Many medicinal scripts/notes can be from Ayurvedic, Chinese, and Unanic medicine civilizations (Subositi and Wahyono 2019). In modern times, plant-based medications are widely used in clinical settings worldwide. With many consumers having shifted to herbal remedies, this has created a surge in demand for medicinal plants on the global market (Mohamad and Kalu 2019).

The genus *Curcuma* is traditionally famous and economically important for its therapeutic and nutritional values. It is vital to Asian cuisine due to its aromatic scent and natural food dye (Mohamad and Kalu 2019). With 93 species acknowledged taxonomically, *Curcuma* originates from the family Zingiberaceae and is widespread throughout tropical and subtropical regions, mainly distributed in India, Thailand, China, Malaysia, Indonesia, and Northern Australia (Sirirugsa et al. 2007).

The genus *Curcuma* has been an essential component of folklore medicine in numerous cultures. It has been reported to be used for the treatment of various disorders such as liver and skin problems and diseases, rheumatism, stomach ache, diarrhea, nausea, gingivitis, motion sickness, hypercholesterolemia, high levels of fatty acids, cancer, hemorrhoids, asthma, inflammation and leprosy (Naksuriya et al. 2014; Subositi and Wahyono 2019; Mahadevhi and Kavitha 2020; Walker and Mittal 2020). Among other ethnobotanical applications of *Curcuma* are condiments, food preservatives, and coloring materials. All parts of the *Curcuma* species (leaves, rhizomes, and inflorescences) have their respective benefits.

Curcuma is rich in bioactive phytochemicals, with the major constituents consisting of phenolics (diarylheptanoids, dihydropyrenate, and isoflavones), essential oils (monoterpenes, sesquiterpenes, diterpenes, and triterpenoids), steroids and alkaloids among others whereas, *Curcuma* essential oil is a blend of volatile terpenes comprising of monoterpenes, sesquiterpenes, diterpenes, and triterpenes. Phenolic compounds originating from natural resources have been interesting since they have demonstrated an interesting spectrum of biological activities such as antioxidant, anti-