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Phytochemical screening and determination of phenolics and flavonoids in *Dillenia pentagyna* using UV–vis and FTIR spectroscopy

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ABSTRACT

Here, we report an ultrasonic-assisted extraction (UAE) of phytochemicals from bark, leaves, sepals, fruits, and seeds of *Dillenia pentagyna* (Roxb) using different organic solvents such as chloroform, ethanol, and n-hexane. The preliminary phytochemical screening results showed that the ethanolic extract is enriched with phenolics, flavonoids, tannin, saponin, alkaloid, and terpenoids. The profiling of phytochemicals is carried out employing UV–Vis and Fourier-transform infrared (FTIR) spectroscopy analyses. The higher amount of phenolic compounds obtained in the ethanolic extract of bark and leaves as compared to other parts of the plant. Consequently, a higher amount of total flavonoid compounds unveiled in the bark of targeted species. The ethanolic extract of bark and leaves showed good free radical scavenging activity using DPPH with inhibition percentage of 90.58 ± 1.89% and 76.46 ± 1.58%, respectively, in comparison to standard ascorbic acid at 10 μg/mL. Moreover, the half-maximal inhibitory concentration (IC_{50}) value of bark and leaves are 5.64 and 6.54 μg/mL, respectively, in comparison to standard ascorbic acid. With the best of our knowledge, it is the first report pertaining to characterization and quantification of phenols and flavonoids as well as the investigation of the medicinal property in *D. pentagyna*.

1. Introduction

There are about 300,000 plant species whose phytochemicals with diverse structures and properties are elucidated [1]. These phytochemicals are divided into two major categories, firstly primary metabolites such as carbohydrates, lipids, proteins; and secondly, secondary metabolites like alkaloids, terpenoids, and phenolic compounds. The primary metabolites are responsible for the growth and development of plants; whereas secondary metabolites play an important role in defense mechanisms against the environmental pollutants, insects, and other foreign threats to the plant [2]. Among, these phenolic compounds and flavonoids are considered to be a very important class of biomolecules having a significant medicinal property for the human being. The basic structure of phenolic compounds (gallic acid, caffeic acid, ferulic acid, protocatechuic acid, and coumaric acid) consists of a phenolic (C_6H_5OH) ring, the carboxylic acid (-COOH) and hydroxyl groups (-OH). Moreover, flavonoids are polyphenols that contain at least two phenolic rings and further categorized into different sub-class such as flavonols, flavonones, flavones, flavanolols, flavan-3-o1s, and isoflavones [3–5]. The antioxidant activity of phenolic compounds and flavonoids is directly proportional to the presence of the hydroxyl (-OH) group in the sample. Further, the positions of hydroxyl groups also affect the ability of free radical scavenging activity [6,7]. The phenolic compounds have already been shown many pharmacological activities such as antimicrobial, antioxidants, anticancer, and antidiabetic [8–10].

Nowadays, the entry of toxic substances through food and drinking water generates free radicals which induce several diseases in the human body. It is due to the free radicals of reactive oxygen species attack on fatty acids, DNA, proteins, lipids, and initiate a rapid destructive chain reaction to damage the cell membranes [11]. The phenolic compounds and flavonoids play a significant role in preventing the damage caused by free radicals [12,13]. Thus, the characterization and determination of phytochemicals such as phenolic compounds and flavonoids in plant samples are essential to know the mechanism of these compounds against various biological activities. Here, different plant parts of *Dillenia pentagyna* (Roxb.) is chosen for the extraction and determination of bioactive components, and free radical scavenging activity of phenolic compounds and flavonoids is investigated.

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