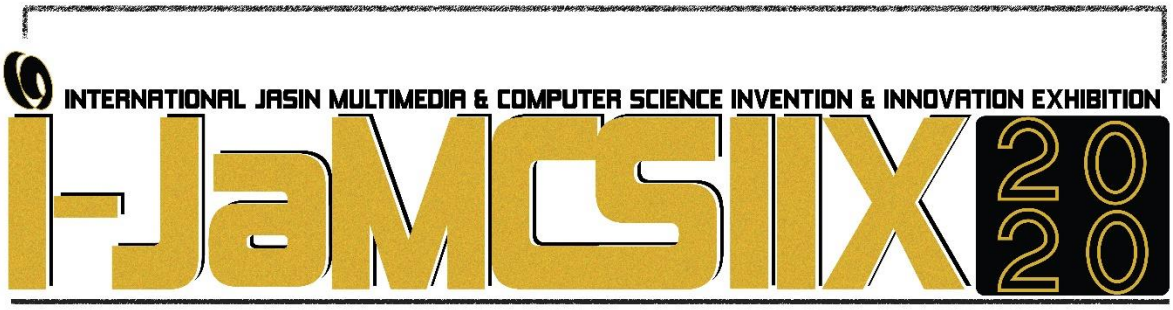

Ficus deltoidea var. *deltoidea* (Mas Cotek): A Promising Natural Antioxidant Agent

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ABSTRACT

Ficus deltoidea var. *deltoidea* or locally known as 'Mas cotek' is a medicinal plant which have been used traditionally to treat toothache, wound, rheumatism, sores as well as to improve blood circulation. This present study was conducted to determine phytochemicals and antioxidant activity of the *n*-hexane, ethyl acetate and methanol extracts of the leaves of *F. deltoidea* var. *deltoidea*. Total phenolic content (TPC) was determined according to the Folin-Ciocalteau colorimetric method, while the antioxidant activity was carried out using 2,2-diphenyl-1-picryhydrazyl (DPPH) radical scavenging assay. Phytochemical screening on the *n*-hexane extract revealed that this extract consisted of terpenes and steroids, while the ethyl acetate extract contained phenolics, saponins, tannins, terpenes and steroids. Flavonoids, phenolics, tannins and glycosides were found to be present in the methanol extract. Among the three extracts, the methanol extract gave the highest total phenolic content (323.74 mg GAE/g extract) and also exhibited the strongest DPPH radical scavenging activity (IC_{50} 129.27 µg/mL). This study suggested that the leaves of *F. deltoidea* var. *deltoidea* might be useful as a promising natural antioxidant for pharmaceutical purpose.

KEYWORDS: *Ficus deltoidea* var. *deltoidea*, phytochemical screening, total phenolic content, antioxidant.

1 INTRODUCTION

Ficus deltoidea is a member of a mulbery family or fig family (Moraceae) [1]. This plant which known in Malaysia as "Mas cotek" or "Serapat angin" is a native plant of Peninsular Malaysia [2] and widely grown in Thailand, Sumatra, Java, Kalimantan, Sulawesi and Moluccas [3]. To date, a total of 16 varieties of *F. deltoidea* including var. *deltoidea* have been reported. These varieties are classified based on morphological of their leaves and figs [1, 2]. *F. deltoidea* have been extensively used to treat countless ailments such as toothache, cold, headache, wound, rheumatism and sores. In addition, this medicinal plant had been also utilized by women as health tonic as well to improve blood circulation [2, 3]. Pharmacologically, *F. deltoidea* is recognized for its number of important bioactivities such as antioxidant, antidiabetic, anti-

inflammation, antinociceptive, wound healing, antiulcerogenic, antibacterial, anticancer and antimelanogenic [1, 2]. Previous phytochemical studies disclosed that this plant composed of a variety of secondary metabolites, for examples, saponins, flavonoids, tannins, polyphenols, triterpenoids and proanthocyanins [4]. In addition, the earlier researchers also managed to isolate two marker compounds identified as vitexin and isovitexin from the leaves of *F. deltoidea* [5, 6].

2 OBJECTIVES

The aims of this study were to extract and screen the phytochemicals from the leaves of *F. deltoidea* var. *deltoidea*. Apart from that, this study was also conducted to determine total phenolic content and antioxidant activity of the leaves extracts.

3 SIGNIFICANCE (S)

This study proposed that the leaves of *F. deltoidea* var. *deltoidea* might be utilized as a source of natural antioxidant for pharmaceutical and nutraceutical purposes. On the other hands, by discovering an alternative antioxidant, the consumption of synthetic antioxidants which cause side-effects can be minimized.

4 METHODOLOGY/TECHNIQUE

Plant material and preparation of extracts

The leaves of *F. deltoidea* var. *deltoidea* was collected in August 2019 from Batu Pahat, Johor. The leaves were dried at 45ºC in an oven for six days and ground into fine powder [7]. Then, the powdered leaves (165.6 g) was soaked sequentially in *n*-hexane, ethyl acetate and methanol (1620 mL each) for three days at room temperature in an orbital shaker (rpm=200). The maceration process was repeated for three times each [8].

Phytochemical screening on the crude extracts

The phytochemical screening tests for alkaloids, flavonoids, phenols, terpenoids, steroids, tannins, quinones, glycosides and saponins were carried out by using the standard methods [9-16].

Determination of total phenolic contents

The total phenolic content was determined by Follin-Ciocalteu method with minor modification [17, 18]. The absorbance was measured at 765 nm using UV/Vis spectrophotometer. The calibration curve was plotted by preparing standard gallic acid solution in methanol. Total phenolic content of the extract was expressed as mg Gallic acid equivalent (GAE)/g of the extract. The analysis was done in triplicate and the TPC value was reported as means ± standard deviation of triplicates.

Determination of antioxidant activity

Antioxidant activity was performed using DPPH radical scavenging assay with some adjustment [19]. The samples in MeOH (0.2 mL) with concentrations ranging from 1000 to 7.81 μg/mL obtained by twofold dilution were mixed with the DPPH solution (3.8 mL, 50 μM). The mixtures were kept for 30 minutes at room temperature in the dark. After incubation time, the absorbance of reaction mixtures were recorded at 517 nm. Ascorbic acid was applied as a standard antioxidant, while DPPH solution was used as DPPH blank. The percentage inhibition

(%) was calculated using the following formula:

$$\% \text{ Inhibition} = [(A_{\text{DPPH blank}} - [A_{\text{sample}} - A_{\text{blank sample}}]) / A_{\text{DPPH blank}}] \times 100\%$$

The IC_{50} value was calculated using GraphPad Prism 6. The assay was carried out in triplicates and the result was recorded as means ± standard deviation.

5 RESULT

Extraction yield, total phenolic content and DPPH radical scavenging activity of *n*-hexane, ethyl acetate and methanol extracts of the leaves of *F. deltoidea* var. *deltoidea* are presented in Table 1. Among the extracts, the methanol extract (4.37%) resulted the highest extraction yield, followed by *n*-hexane (3.56%) and ethyl acetate extract (2.17%). Furthermore, the methanol extract also displayed the highest total phenolic content (323.74 mg GAE/g) and the lowest IC_{50} value (129.27 µg/mL) as compared to the ethyl acetate extract.

Table 1 Yield, total phenolic content and DPPH radical scavenging activity of *F. deltoidea* var. *deltoidea* leaves extracts

Extracts	Yield (%)	TPC (mg GAE/g extract)[a]	DPPH (IC_{50}, µg/mL)[a]
n-Hexane	3.56	ND	ND
Ethyl acetate	2.17	293.78±0.13	143.33±0.02
Methanol	4.37	323.74±0.61	129.27±0.25
Ascorbic acid[b]	-	-	25.61±0.21

[a]Data represent mean ± standard deviation of three replicate experiments; [b]Positive control; ND=not determined.

The results of phytochemical screening for the *n*-hexane, ethyl acetate and methanol extracts of the leaves of *F. deltoidea* var. *deltoidea* are presented in Table 2. From the findings, it was found that terpenes and steroids were present in the *n*-hexane extract, while phenolics, saponins, tannins, terpenes and steroids were existed in the ethyl acetate extract. The methanol extract contained flavonoids, phenolics, tannins and glycosides. Saponins was only detected in the ethyl acetate extract, while flavonoids and glycosides were only found in the methanol extract. In contrast, alkaloids and quinones were found to be absent in all leaves extracts.

Table 2 Phytochemical screening of *F. deltoidea* var. *deltoidea* leaves extracts

Phytochemicals	Extracts		
	***n*-Hexane**	**Ethyl acetate**	**Methanol**
Alkaloids	-	-	-
Flavonoids	-	-	+
Phenolics	-	+	+
Saponins	-	+	-
Tannins	-	+	+
Terpenes	+	+	-
Quinones	-	-	-
Glycosides	-	-	+
Steroids	+	+	-

+ = present; - = absent.

6 CONCLUSION

The phytochemical analysis showed that the leaves extracts of *F. deltoidea var. deltoidea* consist of a mixture of bioactive phytochemicals. The significance TPC value and the potent DPPH radical scavenging activity of the leaves methanol extract indicates that this plant could be beneficial as a source of natural antioxidant to reduce illnesses. From these findings, it is suggested that the methanol extract can be further subjected for the isolation and characterization of phytochemicals that have antioxidant effect.

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