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Phytochemicals, anti-oxidant potential and total phenolics of *Eleusine indica* leaf extracts

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Abstract

Phytochemical screening, total phenolics and antioxidant analyses of *E. indica* were done. The bioactive components of *E. indica* extracts were determined through TLC method, 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging assay was used for the antioxidant activity and Folin – Ciocalteu method was done in determining its total phenolics. Results revealed the presence of phenols, anthrones and coumarins in *E. indica* hot water extract and eleven phytochemicals were detected in *E. indica* ethanolic extracts (essential oils, triterpenes, steroids, phenols, fatty acids, anthraquinones, anthrones, tannins, flavonoids, alkaloids, and coumarins). Also, anti-oxidant activity of both ethanol and water extracts were elucidated with 69.62% and 65.34% RSA, respectively and total phenolics of 256.29 µg/g GAE(*E. indica* hot water) and 249.42 µg/g GAE (ethanol extract) were recorded.

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Introduction

Plants are rich in medicinal properties and has been used as alternative medicine and sources of natural products since time immemorial. Researches proved that these known medical properties of plants can be attributed to its phytochemical compositions (Ell of, 1998; Nair and Chanda, 2004; Ponnanikajamideen *et al.,* 2013).

Phenolic compounds are found in plants and they have been reported to have antioxidant activity which scavenge free radicals such as peroxide, hydroperoxide or lipid peroxyl which were proven to treat various forms of diseases (Kahkonen *et al.* 1999; Chu *et al.* 2002). Thus, the need to exploit plants which are native and ubiquitous in the locality.

Eleusine indica (Linnaeus) Gaertner (Poaceae) is an annual grass with known herbicidal resistance (Yemets*et al.* 2003; Ricardus and Myrna 2007; Al-Zubairi *et al.* 2009). According to Al-Zubairi *et al.* (2009), *E. indica* roots is a known as known traditional remedy of certain diseases such as hypertension, influenza, oliguria, and urine retention. Similarly, plant decoctions and its seeds is a treatment of liver ailment (Iqbal and Gnanaraj 2012).

This study is a continuation of the previous study of Lindain *et al.* (2018). Results of the present study would lead to further utilization of *E. indica* as an alternative drug.

Materials and methods

The same procedure used by Lindain *et al.* (2018) for plant collection and extractions were done. Leaves of *E. indica* were collected at San Jose City, Nueva Ecija. Then the leaves were disinfected, cut, air dried and were pulverized prior to extraction. Hot water and ethanol were used as solvents.

Phytochemical Screening of E. indica

Thin Layer Chromatography (TLC): The bioactive components of *E. indica* leaves was determined using TLC plates. Ethanol and hot water extracts of *E. indica* leaves were sent to St. Mary's University in Bayombong, Nueva Vizcaya.

Antioxidant Screening of E. indica

For the determination of DPPH radical scavenging capacity Kolak *et al.* (2006) and the total phenolic content, *E. indica* was sent to the Chemistry Laboratory of the Center for Natural Sciences at St. Mary's University, Bayombong, Nueva Vizcaya for testing.

Total phenolic content

The total phenolic content of the crude culture extracts was determined using the Folin – Ciocalteu method as described by Hodzic *et al.* (2009).

Results and discussion

Phytochemical composition of E. indica

Phytochemical screening was carried out using thin layer chromatography to detect the presence of secondary metabolites in *E. indica* hot water and ethanol extracts.

Results as presented in table 1 revealed the presence of phenols, anthrones and coumarins in hot water extract of *E. indica*. Whereas, eleven phytochemicals were detected in ethalonic extract of *E. indica* which includes essential oils, triterpenes, steroids, phenols, fatty acids, anthraquinones, anthrones, tannins, flavonoids, alkaloids, and coumarins.

Accordingly, plants produce secondary metabolites with unique pharmacologic and functional activities. These metabolites include the flavonoids, phenols and phenolic glycosides, saponins, cyanogenic glycosides, unsaturated lactones and glucosinolates (Alis *et al.* 1997; Quiroga *et al.*2001; Podolak *et al.* 2007; Kappel 2008).

Flavonoids, alkaloids, triterpenoids and antraquinones have anti-inflammatory, antithrombotic, analgesic, anti-cancer anti-viral, antioxidant, antibacterial and algicidal properties (De Almeida *et al.,* 2010;Kumar and Pandi, 2013; Mierziak *et al.* 2014; Rohinni and Skrikumar, 2014;

Duval *et al.* 2016).Also, tannins were found to have antimicrobial activity due to their ability to link amino acids in proteins, inactivating adhesions, enzymes and transport proteins of cell membranes of microorganisms and it also forms complexes with metal ions, and polysaccharides which affects microorganisms (Cowan 1999; Ashok and Upadhyaya 2012).

Table 1. Phytochemical composition of *E. indica* extracts.

Phytochemicals	Hot water extract	Ethanol extract
Essential oils	-	+
Triterpenes	-	+
Steroids	-	+
Phenols	+	+
Sugar	-	-
Fatty acids	-	+
Anthraquinones	-	+
Anthrones	+	+
Tannins	-	+
Flavonoids	-	+
Alkaloids	-	+
Coumarins	+	+

Note: (+) present; (-) absent.

Antioxidant property of E. indica

As shown in Table 2, ethanol and hot water extract can inhibit free radical formation. *E. indica* hot water extract have exhibited high radical scavenging activity of 69.62% and ethanol extract of 65.34%. Meanwhile, for the total phenolic content, a total of 256.29 µg/g GAE and 249.24 µg/g GAE for *E. indica* hot water extract and ethanol extract were recorded, respectively. The detected total phenolic contents of *E. indica* hot water and ethanolic extracts can be attributed to the presence of phytochemicals such as flavonoids, phenols, terpenoids and cardiac glycosides. In, addition the antioxidant activity of the extracts can be correlated to its total phenolic contents. Results also coincide with the previous study of Al-Zubaira *et al.* (2011).

Table 2. Radical scavenging analysis and total phenolic content of *E. indica* extracts.

E. indica extracts	Radical scavenging activity (%)	Total phenolics (µg/g GAE)
E. indica –hot water	69.62	256.29
E. indica- ethanol extract	65.34	249.42
Catechin (control)	71.68	

*Abs DPPH = 0.678

*Wavelength 517 nm using Spectrum lab 752s UV VIS Spectrophotometer

*Concentration: 1000 ppm.

Phenolic compounds are considered to be a major group of compounds that contribute to the antioxidant activities exhibiting efficiency on the free radicals. Reports indicated that the total phenolics and anti-oxidant of plants are directly proportional (Iqbal *et al.,* 2011; Al-Zubaira *et al.,* 2011; Prior and Cao, 2000).

Conclusion

Based from the results of the study it can be concluded that *E. indica* contains essential oils,

triterpenes, steroids, phenols, fatty acids, anthraquinones, anthrones, tannins, flavonoids, alkaloids, and coumarins. Also, both ethanol and water extracts exhibited anti-oxidant activity with high total phenolics.

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