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Studies on Phenolic Compounds and Anti-Oxidation Property Present in Medicinal Plants of Genus *Ficus*

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ABSTRACT

In recent years, the use of natural antioxidants present in traditional medicinal plants has become of special interest in the scientific world due to their presumed safety and nutritional and therapeutic value. In this present study, investigate phenolic compounds of genus Ficus medicinal plant. The medical plants FicusBenghalnesis, FicusRacemosa, and FicusCaricawere analysed for their total phenolics content by using Folin-Ciocalteu assay. The total phenolic contains in species FicusBenghalnesis is 3.18±1.499 mg/ml and Antioxidant activity is 0.84±0.395 µg/ml. while FicusCarica total phenolic contain is 2.46±1.018 mg/ml and antioxidant activity is 0.27±0.127 µg/ml and in FicusRacemosa total phenolic contain is 3.01±1.461 mg/ml and antioxidant activity is 0.03±0.042 µg/ml. The Bark parts of the FicusBenghalnesis showed higher antioxidant activity that catching in scavenging DPPH free radicals, which indicates that the Extract has good potential as a source for natural antioxidants to prevent Free radical mediated oxidative damage.

KEYWORDS : *Antioxidants, Folin-Ciocalteu assay, DPPH free radicals, FicusBenghalnesis, FicusRacemosa, FicusCarica*

RESEARCH PAPER

Introduction

Presently demands of plant derived antioxidants, especially, the phenolic have gained importance due to their therapeutic importance including antioxidant potential. Epidemiological studies have shown that consumption of plant foods containing antioxidants is beneficial to health because it down-regulates many degenerative processes and can effectively lower the incidence of cancer and cardio-vascular diseases (Arabshahi & Urooj, 2007). High recovery of antioxidant compounds from plant materials can be achieved through different extraction techniques, after studying their chemistry and distribution in the plant matrix. For example, phenolic compounds are present in higher concentrations in the outer tissues (epidermal and sub-epidermal layers) of fruits and grains than in the inner tissues (mesocarp and pulp) (Antolovich et al, 2000).Most frequently used technique for isolation of plant antioxidant compounds is solvent extraction technique. Yield of plant extract and antioxidant activities are strongly dependent on the nature of solvent used for extraction, due to the presence of different antioxidant compounds with varied chemical properties and polarities. These compounds may or may not be soluble in a particular solvent. frequentiy Polar solvents are used for the recovery of polyphenols from a plant materials. The most suitable solvents are aqueous mixtures containing ethanol, methanol, acetone, and ethyl acetate (Pesche et al, 2006). Organic polar solvents methanol and ethanol have been widely used to extract antioxidant compounds from different plants and plant-based foods (Abdille et al, 2005) (fruits, vegetables etc.) such as plum, strawberry, pomegranate, broccoli, rosemary, sage, sumac, rice bran, wheat grain and bran, mango seed kernel, citrus peel, and many other fruit peels (Pesche et al, 2006). Efficacy of ethyl acetate to extract phenolic compounds from onion and citrus peel have been also reported (Zia-ur-Rehman, 2006).It was reported, mixtures of ethanol and acetone used to extract that maximum phenolic compounds from barley flour (Bonoli *et al*, 2004). Similarly, aqueous methanol was used to extracting large amounts of phenolic compounds from rice bran (Chatha et al, 2006) and from *Moringaoleifera* leaves (Siddhuraju& Becker, 2003). Extraction of antioxidant compounds from various plant materials including rice bran, wheat bran, oat groats and hull, coffee beans, citrus peel and guava leaves using aqueous 80% methanol (methanol: water, 80:20 v/v) (Anwar *et al*, 2006).

The medicinal plants selected for the present investigation, which includes *FicusCarica, FicusRacemosa, FicusBenghalnesis* have long been used in the folk medicine due to their potential health promoting and pharmacological attributes, which are mainly ascribed to the presence of antioxidant constituents such as phenolic acids and flavonoids . It is important to establish appropriate means to evaluate and quantify effective antioxidant principles of medicinally or economically viable plant materials. The present study therefore was conducted with the main objective of investigating the most potent antioxidant compounds, especially phenolic compounds from Bark of *FicusCarica, FicusRacemosa, FicusBenghalnesis*medicinal plants.

Material and method

Plant materials:

The targeted plant species for the present experiment is *FicusBenghalnesis (banyan tree), FicusRacemosa (Audumbar tree),* and *FicusCarica (figs tree)*. Plants were collected from different areas of Maulana Azad college campus, Aurangabad. The extract was then prepared by macerating the plant material in three solvent methanol, ethanol and Aceton in ratio (1:10) with plant material and mixture kept at room temperature for 14 days.Then, the extract was filtered; the filtrate was concentrated by air dry. Filtrate stored at -20 ºc for further experiment.

Total phenolic assay:

Total phenolic contents were estimated by using Folin-Ciocalteu method with slight modification. The methanolic extracts and Gallic acid (standard phenolic compound) were mixed with Folin-Ciocalteu reagent (0.5 ml) and incubate at room temperature for 3 min followed addition of 2%Na2CO3 and incubated for 1 min in boiling water bathCoole the sample under tap water and optical density recorded at 650nm.The amount of phenolic was determined by plotting standard graph and concentration expressed in Gallic acid equivalents (GAE mg/ml).

Antioxidant assay:

DPPH radical scavenging activity of the different extracts was estimated using a slight modification of the protocol reported earlier. (Yamaguchi T., et al., 1998).For a typical reaction, 2ml of 100um DPPH solution in ethanol/acetone/methanol was mixed with increasing phenolics concentration of extract. The ascorbic acid was used as standard reference antioxidant. The reaction mixture was recorded at 517nm against the blanks. For the control, DPPH solution in ethanol/acetone/methanol was taken without plant extracts and the optical density was carried out in triplicate. The decrease in optical density of DPPH on

addition of test samples in relation to the control was used to calculate the antioxidant activity, as percentage inhibition of DPPH radical scavenging calculated using the following equation.

Effect of scavenging (%) = (1-A sample (517nm)/A control (517nm)] X 100.

Statistical Analysis:

The experimental results were expressed as the mean+ (-) standard deviation (SD) of replicates. Where applicable, the data were subject to one way analysis of variance (ANOVA) and differences between samples were determined by Bio stat 2,0,1,1,5,8,4 program. Values of $p<0.005$ were regarded as significant.

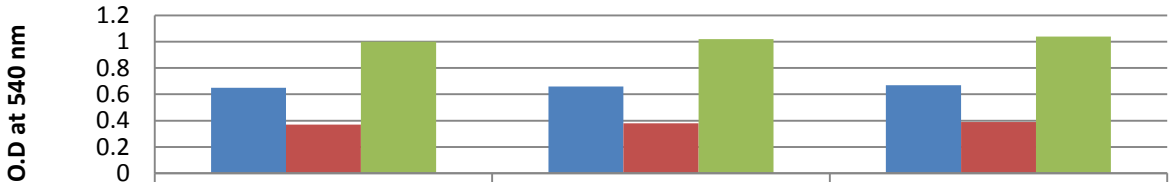
Results and discussion:

The interest in the phenolics has increased outstandingly due to their prominent free radical scavenging activity. Phenolic compounds could be classified as simple phenols, a single aromatic ring bearing at least one hydroxyl group, and polyphenols with at least two phenol subunits like flavonoids or three and more phenol subunits called tannin. The phenolics content in different solvent extracts prepared from barks of *FicusCarica, FicusRacemosa, FicusBenghalnesis* respectively, were estimated by using a standard method of Folin-ciocalteu. Ethanol has been proven as effective solvent to extract phenolic compounds (table 1). The maximum phenolics 3.18±1.499 mg/ml GAE was estimated in Ethanol followed by Acetone and Methanol of *FicusBenghalnesis.* The presence of minimum amount of phenolics among all three species 1.14±0.537 mg/ml was observed in *FicusCarica* species (table 1).

The antioxidant potential was determined by using DPPH (Diphenylpicrylhydrazyl). The increasing concentrations of phenolics were treated with DPPH and their effects were observed like dose dependents Antioxidative potential (figure 1, 2, 3). The maximum IC50 value 0.28 ± 0.395µg/ml was observed in *FicusBenghalnesis* species and the minimum IC50 was observed in *FicusRacemosa* species (table 2). The antioxidant potentials in *FicusBenghalnesis* and *FicusCarica*were similar to standard antioxidant i.e. ascorbic acid (0.50). The IC50 value of *FicusRacemosa*was minimum and hence it was conformed that the phenolics in *FicusBenghalnesis* have an enormous Antioxidative potential than two other species. The phenolics in *FicusCarica* also have an excellent Antioxidative potential. DPPH is a stable free radical .When antioxidant reacts with this stable radical, the electron becomes paired off and bleaching of the colour stochiometically depends on the number of electrons taken up.

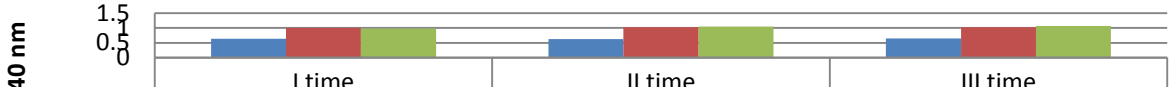
Graph 1: Graph of three target species total phenolics content obtained in target species compared With Standered Gallic acid

Ficus Carica



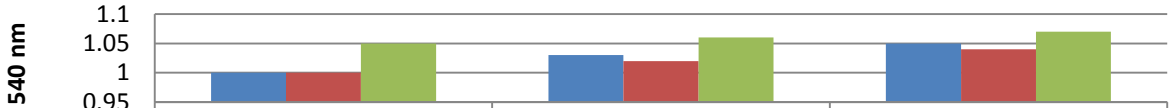
	I time	II time	III time
Ethanol	0.65	0.66	0.67
Acetone	0.37	0.38	0.39
Methanol	1	1.02	1.04

Ficus Racemosa



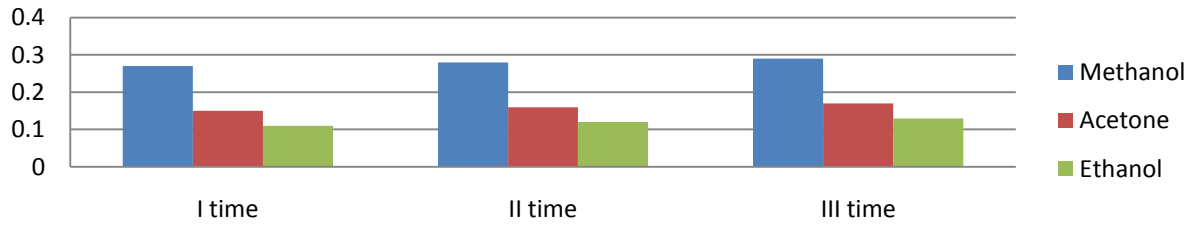
	I time	II time	III time
Methanol	0.64	0.63	0.65
Acetone	1	1.02	1.03

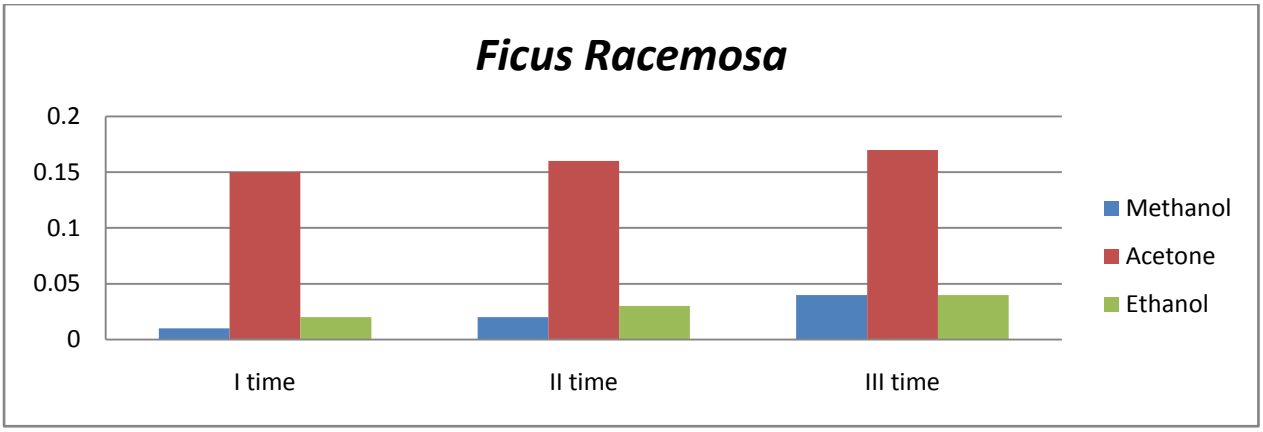
Ficus Benghalnesis



	I time	II time	III time
Methanol	1	1.03	1.05
Acetone	1	1.02	1.04
Ethanol	1.05	1.06	1.07

Ficus Benghalnesis





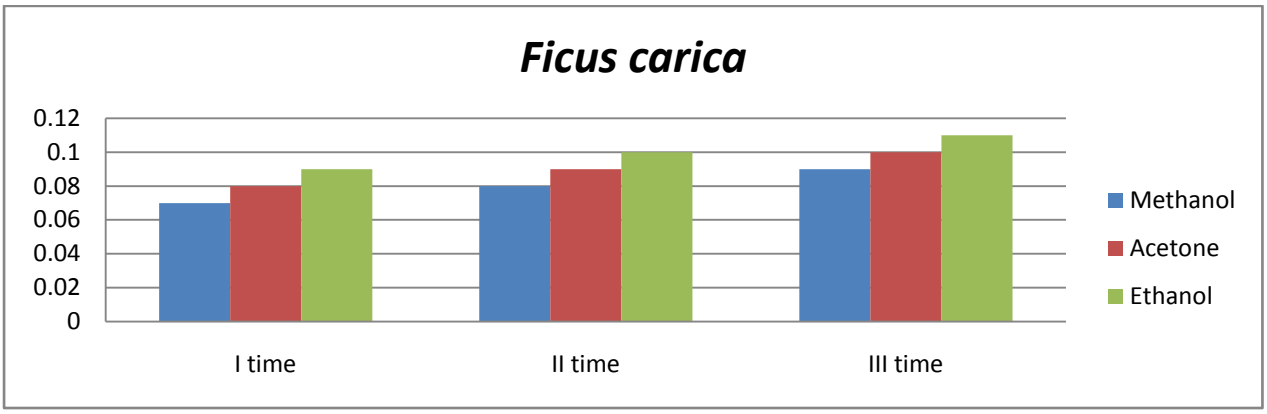


Fig 2: DPPH scavenging activity of targeted species compared with standard Ascorbic acid

Table 1: Total phenolic content and Antioxidative potential of *Ficus* species

Sr.no	Medicinal plants	Total Phenolics contain GAE in mg/ml(n=3)	IC50 µ/ml (n=3)
1.	*FicusBenghalnesis*	3.18±1.499	0.84±0.395
2.	*FicusCarica*	2.46±1.018	0.27±0.127
3.	*FicusRacemosa*	3.01±1.461	0.03±0.042

Conclusion :

The result of Ethanolic extract of *FicusCarica, FicusRacemosa, and FicusBenghalnesis* showed strong antioxidant and free radical scavenging activity. It has been recognized that the total phenolic content enhance the free radical scavenging activity due to the presence of hydroxyl groups. The Bark parts of the *FicusBenghalnesis* showed higher antioxidant activity that catching in scavenging DPPH free radicals, which indicates that the Extract has good potential as a source for natural antioxidants to prevent Free radical mediated oxidative damage. A little differences of antioxidant activity also were observed in all three species

taken for experiment plants. The total phenolic contains in species *FicusBenghalnesis* is 3.18±1.499 mg/ml and Antioxidant activity is 0.84±0.395µg/ml. In *FicusCarica* total phenolic contain is 2.46±1.018mg/ml and antioxidant activity is 0.27±0.127µg/ml.And in *FicusRacemosa* total phenolic contain is 3.01±1.461 and antioxidant activity is 0.03±0.042µg/ml.

REFERENCES

Abdille, M. H., Singh, R. P., Jayaprakasha, G. K., & Jena, B. S. (2005). Antioxidant activity of the extracts from Dilleniaindica fruits. *Food chemistry*, *90*(4), 891-896.

Antolovich, M., Prenzler, P., Robards, K., & Ryan, D. (2000). Sample preparation in the determination of phenolic compounds in fruits. *Analyst*, *125*(5), 989-1009.

Anwar, F., Jamil, A., Iqbal, S., & Sheikh, M. A. (2006). Antioxidant activity of various plant extracts under ambient and accelerated storage of sunflower oil. *Grasas y Aceites*, *57*(2), 189-197.

Arabshahi-Delouee, S., &Urooj, A. (2007). Antioxidant properties of various solvent extracts of mulberry (Morusindica L.) leaves. *Food Chemistry*, *102*(4), 1233-1240.

Bonoli, M., Verardo, V., Marconi, E., &Caboni, M. F. (2004). Antioxidant phenols in barley (Hordeumvulgare L.) flour: comparative spectrophotometric study among

Chatha, S. A. S., Anwar, F., &Manzoor, M. (2006). Evaluation of the antioxidant activity of rice bran extracts using different antioxidant assays. *Grasas y aceites*, *57*(3), 328-335.

Peschel, W., Sánchez-Rabaneda, F., Diekmann, W., Plescher, A., Gartzía, I., Jiménez, D. ...&Codina, C. (2006). An industrial approach in the search of natural antioxidants from vegetable and fruit wastes. *Food Chemistry*, *97*(1), 137-150.

Siddhuraju, P., & Becker, K. (2003). Antioxidant properties of various solvent extracts of total phenolic constituents from three different agroclimatic origins of drumstick tree (Moringaoleifera Lam.) leaves. *Journal of agricultural and food chemistry*, *51*(8), 2144-2155.

Wannes, W. A., Mhamdi, B., Sriti, J., Jemia, M. B., Ouchikh, O., Hamdaoui, G., ...&Marzouk, B. (2010). Antioxidant activities of the essential oils and methanol extracts from myrtle (Myrtuscommunis var. italica L.) leaf, stem and flower. *Food and Chemical Toxicology*, *48*(5), 1362-1370.

Yamaguchi, T., Takamura, H., Matoba, T., &Terao, J. (1998). HPLC method for evaluation of the free radical-scavenging activity of foods by using 1, 1-diphenyl-2-picrylhydrazyl. *Bioscience, biotechnology, and biochemistry*, *62*(6), 1201-1204.

Zia-ur-Rehman. (2006). Citrus peel extract-A natural source of antioxidant. *Food Chemistry*, *99*(3), 450-454.