

Research Article



Phytochemical Analysis and Antioxidant Activity of Aqueous Peel Extract of *Ficus carica* (fig extract) by DPPH, Nitrous Oxide Method

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ABSTRACT

This study aims at performing a preliminary phytochemical analysis to evaluate the phytochemical composition and antioxidant activity of aqueous *Ficus carica* peel extract. Preliminary phytochemical analysis of aqueous *Ficus carica* extract was done. *Ficus carica* peel extract was found to contain phytochemicals like flavonoids, alkaloids, coumarins, steroids, quinones and tannins. Antioxidants potential was also estimated by NO and DPPH method. Figs are a good source of many enriching vitamins, antioxidants, and minerals. Improving overall health, balances skin nutrition and helps improve circulation. Further research is required to know the extract mechanism of action of fig as an antioxidant.

Keywords: *Ficus carica*, DPPH, NO.

INTRODUCTION

India is very rich in large variety of plants which grow in different parts of the country. India is rich in all the three levels of biodiversity that is species diversity, generic diversity and habitat diversity.⁶ Today the demand for traditional medicine as well as the drugs obtained from plants has increased rapidly. Since so many years plants have been an important source for medicines.^{1, 11} *Ficus* (Moraceae) is one of the largest genera in angiosperms with 800 species. It is an important genetic resource due to its high economic and nutritional values.² *F. carica* L. It is an important member of the genus *Ficus*. It is commonly referred to as fig. It is native to southwest Asia and the eastern Mediterranean,^{3, 4, and 12} and it is one of the first plants that were cultivated by humans. The dried fruits of *F. carica* have been reported as an important source of vitamins, minerals, carbohydrates, sugars, organic acids, and phenolic compounds. The fresh and dried figs also contain high amounts of fibre and polyphenols. It is used to treat gastrointestinal (colic, indigestion, loss of appetite, and diarrhoea), respiratory (sore throats, coughs, and bronchial problems), and cardiovascular disorders and as anti-inflammatory. *Ficus carica* plays many physiological roles as it contains phenolic compounds.² Antioxidants in food are of interest for four major reasons: they can protect the food itself against oxidative damage, they can exert antioxidant effects in the human gastrointestinal tract, they can be absorbed and exert antioxidant effects in other body tissues, and they may be used in plant extracts, or as pure compounds, as therapeutic agents.⁸

Phytochemical properties

F. carica have numerous bioactive compounds such as Mucilages, flavonoids, vitamins, enzymes, nicotinic acid,

and tyrosin. Ficusin, bergaptene, stigmasterol, psoralen, taraxasterol, beta-sitosterol, rutin, saponin, Calotropenyl acetate, lepeolacetate and oleanolic acid sistosterol are present in the leaf. The plant also contains arabinose, β-amyrins, β- carotines, glycosides, β- setosterols and xanthotoxol¹⁶⁻¹⁸. Umbelliferone^{19,20}, campesterol, , fucosterol, fatty acids²¹, 6-(2- methoxy- Z- vinyl)-7-methyl-pyranocoumarin and 9,19- cycloarlane triterpenoid as an anticancer ²² and 6-O- acyl-β-Dglucosyl -β-sitosterol ²³, calotropenyl acetate, and lupeol acetate ²⁴as an antiproliferative agent.[¹⁰]

MATERIALS AND METHODS

Preparation of *Ficus carica* peel extract

Ficus carica was brought in Koyambedu market. Care was taken to select the fresh and juicy fruit. The fruit was washed thoroughly to remove all the foreign particles present on it. It was then peeled and an aqueous extract of the peel was made. The extract was lyophilized.

Photochemical analysis

Photochemical analysis of *Ficus carica* peel extract was done according to harbore et al.⁹⁾

Test for carbohydrates

To 2ml of plant extract, 1ml of Molisch's reagent and few drops of concentrated sulphuric acid were added. Presence of purple or reddish color indicates the presence of carbohydrates.

Test for tannins

To 1ml of plant extract, 2ml of 5% ferric chloride was added. Formation of dark blue or greenish black indicates the presence of tannins.



Test for saponins

To 2ml of plant extract, 2ml of distilled water was added and shaken in a graduated cylinder for 15 minutes lengthwise. Formation of 1cm layer of foam indicates the presence of saponins.

Test for flavonoids

To 2ml of plant extract, 1ml of 2N sodium hydroxide was added. Presence of yellow color indicates the presence of flavonoids.

Test for alkaloids

To 2ml of plant extract, 2ml of concentrated hydrochloric acid was added. Then few drops of Mayer's reagent were added. Presence of green color or white precipitate indicates the presence of alkaloids.

Test for quinones

To 1ml of extract, 1ml of concentrated sulphuric acid was added. Formation of red color indicates presence of quinones.

Test for glycosides

To 2ml of plant extract, 3ml of chloroform and 10% ammonia solution was added. Formation of pink color indicates presence of glycosides.

Test for cardiac glycosides

To 0.5ml of extract, 2ml of glacial acetic acid and few drops of 5% ferric chloride were added. This was under layered with 1 ml of concentrated sulphuric acid. Formation of brown ring at the interface indicates presence of cardiac glycosides.

Test for terpenoids

To 0.5ml of extract, 2ml of chloroform was added and concentrated sulphuric acid was added carefully. Formation of red brown color at the interface indicates presence of terpenoids.

Test for triterpenoids

To 1.5ml of extract, 1ml of Libermann –Buchard Reagent (aecticanhydride + concentrated sulphuric acid) was added. Formation of blue green color indicates presence of triterpenoids.

Test for phenols

To 1ml of the extract, a few drops of Phenol Cicalteau's reagent were added followed by few drops of 15% Sodium carbonate solution. Formation of blue or green color indicates presence of phenols.

Test for coumarins

To 1 ml of extract, 1ml of 10% NaOH was added. Formation of yellow color indicates presence of coumarins.

Steroids and phytosteroids

To 1ml of plant extract equal volume of chloroform is added and subjected with few drops of concentrated sulphuric acid appearance of brown ring indicates the presence of steroids and appearance of bluish brown ring indicates the presence of phytosteroids.

Phlobatannins

To 1ml of plant extract few drops of 2% HCL was added appearance of red color precipitate indicates the presence of phlobatannins.

Anthraquinones

To 1ml of plant extract few drops of 10% ammonia solution was added, appearance pink color precipitate indicates the presence of anthraquinones.

Estimation of antioxidant activity of *Ficus carica* by NO method

The nitric oxide assay was performed as described previously with slight modification. A stock solution of leaf extracts and ascorbic acid was prepared to the concentration of 10 mg/ml.¹³ The reaction mixture consists of 2ml of sodium nitroprusside (10mM) and 0.1ml of Phosphate buffered saline with different concentration of samples (concentrations – 200, 400, 600, 800, 1000µg) incubated at 25°C for 150 min. After incubation, 0.5ml of reaction mixture was mixed with 1ml of 1% sulfanilamide and allowed to stand for 5min for complete diazotization. Then 1ml of 0.1% naphthylethylenediamine dihydrochloride was added, mixed and allowed to stand for 30min at 25°C. The absorbance at 540 nm was measured in a UV spectrophotometer. Blank consists of all the reagents except for the extract or standard solution is substituted with water. The annihilation activity of free radicals was calculated in % inhibition according to the following relation:

$$\text{Inhibition \%} = \frac{(\text{Absorbance of control} - \text{Absorbance of sample})}{\text{Absorbance of control}}$$

Estimation of antioxidant activity of *Ficus carica* by DPPH method

The ability of the samples to annihilate the DPPH radical (1,1-diphenyl-2-picrylhydrazyl) was investigated by the method described by (Blois 1958). Stock solution of compound was prepared to the concentration of 10 mg/ml. Different concentration of the extract (200, 400, 600, 800, 1000 µg) of sample were added, at an equal volume to methanolic solution of DPPH (0.1mM). The reaction mixture is incubated for 30min at room temperature; the absorbance was recorded at 517 nm.¹⁴ The experiment was repeated for three times. Ascorbic acid was used as standard control. The annihilation activity of free radicals was calculated in percentage inhibition according to the following formula



% of Inhibition = (A of control – A of Test)/A of control * 100.

RESULTS AND DISCUSSION

Photochemical analyses of *Ficus carica* peel extract

Phyto chemicals	Fig peel extract
Carbohydrates	-
Tannins	+
Saponins	-
Flavonoids	++
Quinones	+
Alkaloids	++
Glycosides	-
Cardiac glycosides	-
Terpenoids	-
Phenols	++
Coumarins	++
Steroids	-
Phytosteroids	-
Phylobatannins	-
Anthraquinone	-

Figure no: 1

The fig peel extract showed a strong presence of flavonoids, alkaloids, phenols and coumarins. Quinones and tannins were also present but in a lesser concentration. Carbohydrates, saponins, glycosides, cardiac glycosides, terpenoids, steroids, phytosteroids, phylobatannins and anthraquinone were absent. (figure no:1).

Estimation of antioxidant activity of *Ficus carica* by NO method

Conc in µg	%inhibition	
	sample	Positive Control
200	27.27	66.06
400	35.41	74.39
600	38.72	81.10
800	49.22	88.76
1000	56.42	94.95

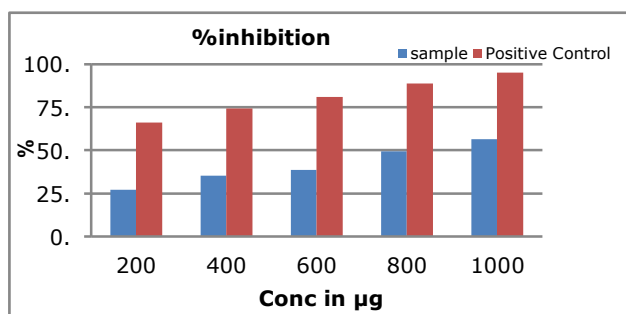


Figure no: 2

Figure shows percentage inhibition of Samples and PC (graph no: 1)

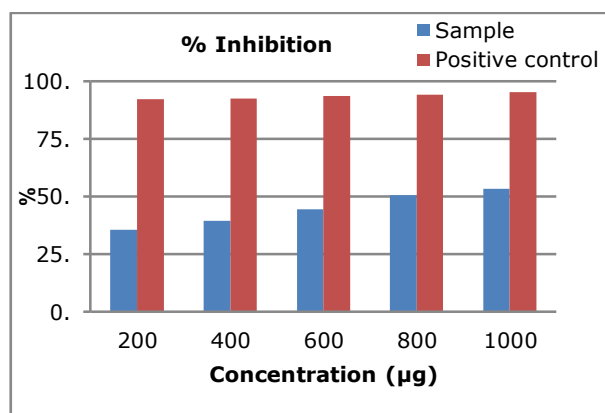
PC – Positive control (Ascorbic acid)

800 micro grams *Ficus carica* peel extract exhibited 50%inhibition by NO method. As the concentration of extract increased conveniently there was an increase in inhibitory activity, thus proving the antioxidant activity of *Ficus carica* peel extract. Though the inhibitory activity of *Ficus carica* is comparatively less than the positive control (ascorbic acid), the antioxidant potential of the peel extract was significant. (figure no:2, graph no:1)

Estimation of antioxidant activity of *Ficus carica* by DPPH method

Concentration (µg)	Percentage inhibition	
	Sample	Positive control
200	35.65	92.31
400	39.31	92.35
600	44.31	93.49
800	50.61	94.03
1000	53.24	95.26

Figure shows percentage inhibition of sample (figure no: 3



Graph no: 2

Antioxidant activity *Ficus carica* peel extract was analysed by DPPH method, with ascorbic acid as standard. 800 micro grams of *Ficus carica* peel extract showed 50% inhibition. As the case of *Ficus carica* peel extract increased, there was a significant increase, in the antioxidant potential. (figure no:3, graph no:2)

Ficus carica peel extract was found to contain phytochemicals like flavanoids, alkaloids, coumarins, steroids, quinones and tannins. Antioxidants potential was also estimated by NO and DPPH method.

CONCLUSION

Fig peel extract was found to be a good source of flavonoids, alkaloid, and phenols. The peel extract showed a good antioxidant potential also. Presence of Antioxidant potential indicates a significant therapeutic value. In future the extract can be tested for anti-cancer properties. The fruit is edible and does not require a tedious processing, thus can be used in drug formulation.



REFERENCES

1. Joseph B, Raj SJ. A Comparative Study on Various Properties of Five Medicinally Important Plants. *International Journal of Pharmacology* 7, 2011, 206-211.
2. Mawa, S., Husain, K. and Jantan, I., 2013. *Ficus carica* L.(Moraceae): phytochemistry, traditional uses and biological activities. *Evidence-Based Complementary and Alternative Medicine*, 2013.
3. Tous J, Ferguson L. Mediterranean fruits. J. Janick Edition, *Progress in New Crops*, ASHS Press, Arlington, VA, USA, 1996, 416–430.
4. Solomon A, Golubowicz S, Yablowicz Z. Antioxidant activities and anthocyanin content of fresh fruits of common fig (*Ficus carica* L.). *Journal of Agricultural and Food Chemistry* 54(20), 2006, 7717–7723.
5. Veberic R, Colaric M, Stampar F. Phenolic acids and flavonoids of fig fruit (*Ficus carica* L.) in the northern Mediterranean region. *Food Chemistry* 106(1), 2008; 153–157.
6. Baytop T (1984): *Therapy with Medicinal Plants in Turkey*. No. 3255. Istanbul, Publications of Istanbul University.
7. Bellakhdar J, Claisse R, Fleurentin J, Younos C (1991), *Repertory of standard herbal drugs in the Moroccan*
8. Halliwell, B., 1999. Food-derived antioxidants. Evaluating their importance in food and in vivo. *Food science and agricultural chemistry*.
9. Harborne JB (1973). *Phytochemical Methods: A guide to modern techniques of plant analysis*. Chapman and Hall, New York, 3rd Edition, pp. 279.
10. Joseph, B. and Raj, S.J., 2011. Pharmacognostic and phytochemical properties of *Ficus carica* Linn—An overview. *International Journal of PharmTech Research*, 3(1), pp.8-12.
11. Bucić-Kojić, A., Planinić, M., Tomas, S., Jokić, S., Mujić, I., Bilić, M. and Velić, D., 2011. Effect of extraction conditions on the extractability of phenolic compounds from lyophilised fig fruits (*Ficus carica* L.). *Polish journal of food and nutrition sciences*, 61(3), pp.195-199.
12. Patil, V.V. and Patil, V.R., 2011. *Ficus carica* Linn. An overview. *J Med Plant Res*, 5(3), pp.246-53.
13. Ralston, S.H., 1997. The Michael Mason Prize Essay 1997. Nitric oxide and bone: what a gas!. *Rheumatology*, 36(8), pp.831-838.
14. Blois MS (1958). Antioxidant determinations by the use of a stable free radical, *Nature*, 29, 1199-1200.

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