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Polyphenolics content and Antioxidant activity of *Carthamus tinctorius* L, *Arachis hypogaea* L, and *Ponngamia pinata* L methanol extracts

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Abstract: In traditional medicine system large number of plant are used in formulation. Amongst that *Carthamus tinctorius*, *Ponngamia pinata* (L.) & *Arachis hypogaea* L plants parts and oil used for formulations. Therefore present work had carried out on estimation of antioxidants capacity and total polyphenolic contents of these plants. In *Carthamus tinctorius* & *Ponngamia pinata* L are having the maximum amount of polyphenolics compounds 6.473 and 5.822 mg of gallic acid / gm of sample and ferric reducing antioxidant potential 23.49 and 19.10 Fe (II) FeSO₄mM/gm. When a total antioxidant activity was measured with phosphomolybdate assay based on reduction of Mo (III) to Mo (IV) reduction. Maximum antioxidant capacity is found in *Carthamus tinctorius* & *Ponngamia piñata* L 42.42, and 29.77 was found mM of ascorbic acid/ gm.

Keywords: Antioxidant, Medicinal plants, polyphenolics, *Carthamus tinctorius*, Polyphenolics.

INTRODUCTION

Traditional medicinal as well as in complementary alternative medicinal system is having better demand in the world due to its beneficial effect against the various diseases and disorders. *Carthamus tinctorius*, *Ponngamia piñata* L. and *Arachis hypogaea* L plants materials are widely used in the formulation of medicine for hypertension, bronchitis, whooping cough, skin diseases and rheumatic arthritis. Especially crushed seeds and leaves are regarded as having antiseptic properties. In India, seeds were used for skin ailments (Wang and Li, 1985; Wu, Yi and Huo, 1992; Dong, Xue and Yu, 1988). Now a day the oil is used as a liniment for rheumatism; their juice is used for colds, coughs, diarrhea, dyspepsia, flatulence, gonorrhea, and leprosy (Dong, Xue and Yu, 1988; Wang and Wang, 1990). These plants are widely used for the treatment of fever in India. In China it is used for in the treatment of many disorders and diseases including menstrual problems, cardiovascular disease, pain and swelling associated with trauma, chronic and atrophic gastritis, rheumatism, and chronic nephritis (Wang and Li, 1985; Shen Hua and Yu, 1999). Such wide range of these plants use in ayurvedic preparations proves their medicinal importance. Therefore Present work is carried out on study of analysis of total polyphenolics and antioxidant activity of methanol extracts.

Materials and Methods

Chemicals

Methanol, Qualagen, Gallic acid, Ascorbic acid of Sigma company (Germany), Quercetin, Hydrochloric acid (HCl), Ferrous sulphate (FeSO₄), Sulfuric acid, Sodium phosphate, Ammonium molybdate, Ammonium

ferrous sulphate ($\text{NH}_3(\text{FeSO}_4)$), Acetic acid Ferric chloride (FeCl_3), Folin ciocalteu reagent (FC reagent), (TPTZ), Methanol (HPLC gradient grade) was purchased from Merck. Milli-Q water was used in all experiments.

Extraction

Carthamus tinctorius, *Ponngamia piñata* L. and *Arachis hypogaea* L of defatted seed residue were purchased from local market pune (India). A plant material was dried at 37°C temperature and thereafter stored plastic bag in the dark atmosphere. Different plants *Carthamus tinctorius*, *Ponngamia pinata* L. and *Arachis hypogaea* L in powder (1 gm) of was mixed with 15 mL of MeOH solvent over a period of 24 hr. at 37°C . Then mixture was filtered through whatman filter paper Final volume were made 15 mL.

Estimation of polyphenolics content

Total polyphenolic content was analyzed by the Folin–Ciocalteu method (Mazza, 1986). Containing final reaction volume (3.6 mL) contains $100\mu\text{L}$ of FC reagent; $60\mu\text{g}$ of saturated sodium carbonate was incubated at 37°C for 30 min in water bath. Absorbance of solution was read at 765 nm in triplicate. Gallic acid ($100\mu\text{g/mL}$) was used as standard for calibration curve. The results were expressed as mg of gallic acid equivalent (mg GAE)/g dry weight of sample.

Total antioxidant potential

Total antioxidant potential of crude extract was determined by the method of Prieto et al. (Jayprakash, Rao and Sakaiah, 2004). Final volume of the reaction 3.010 ml containing 3.0ml of (0.6 M sulfuric acid, 28 mM sodium phosphate, and 4 mM ammonium molybdate) $10\mu\text{L}$ of the respective extract incubated at 95°C for 90 min. After the samples had cooled to room temperature, the absorbance of the aqueous solution of each was measured at 695 nm against blank in UV–visible spectrophotometer. Total antioxidant potential was determined as mM of ascorbic acid equivalent.

Ferric-reducing antioxidant potential

The FRAP assay was carried out according to the procedure of Benzie and Strain (1996) with modification. Briefly, the FRAP reagent was prepared from sodium acetate buffer (300 mMol/L, pH 3.6), 10 mMol/L TPTZ solution in 40 mMol/L HCl and 20 mMol/L FeCl_3 in 40mMol/L HCl solution in proportions of 10:1:1 (v/v), respectively. The FRAP reagent was stored in cooled condition at $0 - 4^\circ\text{C}$ for five days before use of reagent was warmed to 37°C in a water bath prior to use. $25\mu\text{L}$ of each extracts were added to 1.475 mL of sodium acetate buffer and 1.5 mL of FRAP reagent. The absorbance of the reaction mixture was then recorded at 593 nm after 5 min, the assay was carried out in triplicate. The standard curve was constructed using FeSO_4 solution ($10\text{--}100\mu\text{mol/L}$). The results were expressed as $\mu\text{M Fe (II)}$ /g dry weight of sample.

Result and Discussion

Table 1: Analysis of total Polyphenolics and antioxidant potential of plants

Plant name	Polyphenolic content mg of gallic acid/g sample	Antioxidant activity Fe (II) FeSO_4 mM/gm	Antioxidant activity mM ascorbic acid /gm
<i>Carthamus tinctorius</i>	6.473 ± 0.021	23.49 ± 2.038	42.42 ± 1.675
<i>Arachis hypogaea</i> L	3.552 ± 0.018	18.25 ± 1.061	13.80 ± 0.931
<i>Ponngamia piñata</i> L	5.822 ± 0.013	19.10 ± 0.502	29.77 ± 1.048

Analysis of polyphenolics

The Folin–Ciocalteu reagent is used to obtain a crude estimation of phenolic compounds present in extracts. Polyphenolic contents were obtained in various oil cakes methanol extract were shown in table No - 1. In *Carthamus tinctorius* and *Ponngamia piñata* L contains maximum amount of polyphenolics compounds 6.473

and 5.822 mg of gallic acid / gm of oil cake. Because of the high polyphenolics this plant might be responsible for various activities (Liu et al., 2007; Verzelloni and Tagliazucchi, 2007).

Antioxidant activities

*Determination of the antioxidant potential of fruits vegetables and active component was carried out by reduction of metals based study (Jayprakash, Rao and Sakaiah, 2004; Benzie and Strain, 1996). As model of the Fenton reaction which is responsible for the generation of free radicals. In the present study Iron and molybdate based assay was used to find out antioxidant potential of extracts in which Fe based FRAP assay result obtained was mentioned in table - 1. Carthamus tinctorius and Pongamia pinnata L 23.49, 19.10 Fe (II) $FeSO_4$ mM/gm are having maximum FRAP value as compare to other. Where as total antioxidant potential by phosphomolybdate method showed in table - 1. Carthamus tinctorius and Pongamia pinnata L 53.06, 42.42 and 29.77 mM of Ascorbic acid eq./gm of sample. The close correlation between **antioxidant activity** and phenolic content of extracts obtained from various natural sources has been demonstrated by many workers (Taha et al., 2004; Ballal, 2005; Tanaka et al., 1992).*

Presence of phenolic s compound is responsible for antioxidant activity (Carcache et al., 2003; Burkill, 1996).

Conclusion

Presence of polyphenolics and antioxidant activity in medicinal plants were important for various diseases like cardiovascular, aging, cancer. Antioxidant can be useful to scavenge free radical generated in cell. Antioxidant in plants might be responsible clinical application of plant in traditional medicine.

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