

## ORIGINAL ARTICLE

# Antioxidant and Iron Chelating Activity of *Coriander sativum* and *Petroselinum crispum*

<sup>1</sup>Ali Mirzaei, <sup>2</sup>Raheleh Khatami \*

<sup>1</sup>Medicinal plant Research Centre, Yasuj Medical Sciences University, Yasuj, Iran

<sup>2</sup> Student committee Research Centre, Medical Sciences University, Yasuj Iran

### ABSTRACT

Metals with normal concentration have essential roles in body metabolism however, in higher concentration they can be induce sever toxicity. Treatment with chelating agent is useful practice to reduce metals toxicity in live organisms. The aim of this study was evaluated of antioxidant operties and iron chelating for screening of medicinal plants. The plants were collected ,dried in shade for extractions .Extraction of plants was performed by maceration and decoction methods and four solvent including distilled water,ethanol, petroleumeter and isotonic buffer .From each extract different concentration were prepared . Phenol, flavonoids, antioxidant activity and iron chelating properties were measured.. The *C. sativa* extract had the highest total phenols, flavonoids content and antioxidant activity by hydro- alcoholic extracts. *Petroselinum crispum* extract contain minimum Phenol and flavonoid concentration and antioxidant potential by Phosphate extract. Iron chelating activity of *C. sativa* extract was reported more than *Petroselinum crispum*. A significant correlation between iron chelating with phenols and flavonoids and a weak relation with antioxidant potential ( $R^2 = 0.4$ ) was reported. *Coriander sativa* extracts was good chelator for iron ion at in vitro state. This study was directed for introduce of plant extracts on iron toxicity treatment.

**Key words:** iron chelating , Antioxidant activity, total phenol,flavnoid contents

Received 12.05.2013 Accepted 12.06.2013

© 2013 AE LS, India

### INTRODUCTION

Synthetic chelators are small molecules that strongly bind to metal ions which used for iron excretion. They can bind to ions and produce metal – chelator complex to remove the metals from inside of the body [1].

Metals with normal concentration have essential roles in body metabolism however;in higher concentration they can induce sever toxicity. Treatment with chelating agent is an optimal method to reduce metals toxicity in organisms [2].

Parenteral administration of deferoxamine (DFO) as a synthetic metal chelator is necessary dueto low oral absorption. Itmay reduceside effect of iron overload, morbidity,mortality and oxidative stress between those who are use regular prolonged infusions. Invasive parenteral administration, side effects and short half-life (12 minutes) are the cause of lowefficiency and usefulness of present cheater was reported in literatures [2].

Deferiproneis an oral synthetic chelator which used safely for iron overload treatment in thalassemiapatient. This is most effective in view of cardiac protection in thalassemiapatient due to more decreased myocardial siderosis than other synthetic iron chelators.This drug excreted through urine and its side effectsreduced white blood cellparticularlyneutrophiland infection were reported in literatures [3].

Deferasirox was certified and confirmed in 2006 by the European Union and is used widelyfor thetreatment of iron toxicity in thalassemia patients by oral route. High price of this drugis a problem in therapeutic practice.it is slowly cleared through hepatobiliary system [3].

Generally, chelating agents that used recently for treat of thalassemiahave reported with high price and a lot of side effects. Therefore, for application of present metal chelators some limitation was recorded [4].

A natural chelator is essential for iron excretion with low side effects and price as a new practice.

Metals ions such as calcium, iron, and zinc, copper and lead are very important role as a catalyst in the oxidation pathway. They are important source for free radical development such as hydroxyl and of hydro peroxide radicals [4].

According to, metal toxicity is increasing; treatment with chelators is an important tool for prevention of metal-storage diseases. Treatment with chelating metals including iron and calcium reduces the complications of metals overload in the body, thus will increase of life and generally increase in quality of life in a lot of disease such as thalassemia major and cardiac disease.

Plants with iron chelating activity are most effective for reduce of lipid peroxidation reaction and therefore play a key role in medicinal practice [5].

The aim of present work was identification and introducing of medicinal plants with the highest activity by metal chelating potential for iron toxicity treatment.

*Coriander sativum* is a plant belonging to Apiaceae family with rich of phytochemicals such as total phenol, tannin, mineral salts, and vitamin. It has different activity including antibacterial, antioxidant, and diuretic. It is used to treat of neurological disorders, diabetes, and hyper lipidemia.

*Petroselinum crispum* is belonging to Apiaceae family. It contains mineral salts, coumarin, alkaloid and vitamins. It has antibacterial and diuretic activity and used to treat muscle cramps and rheumatoid arthritis [6].

## METHODS AND MATERIALS

The plants were collected in Shiraz and Yasuj in March 2012. The recognized plants were deposited in herbarium of medicinal plants research center of Yasuj Medical Sciences University. Samples were dried in shade for extractions. Extraction of plants was performed by maceration and decoction methods and four solvent including distilled water, ethanol, petroleum ether and isotonic buffer. From each extract different concentrations 1, 2, 3 and 5 mg/ml were prepared.

**Estimation of total phenol:** The total phenol contents were determined by Folin-Ciocalteu method, compare to Gallic acid standard [7].

**Estimation of total flavonoid:** The total flavonoid content was determined with aluminum chloride method compare to rutin as a standard /g extract [8].

**Antioxidant activity of Diphenyl-picrylhydrazyl (DPPH):** The antioxidant activity of extract determined by Percent of inhibition as follow: % Inhibition =  $[(A_0 - A_1)/A_0] \times 100$

$A_0$  was the absorbance of control and  $A_1$  was the absorbance of the extracts [9].

**Metal chelating activity:** The chelation of  $Fe^{2+}$  ions by extracts was determined using Dinis method [10].  $IC_{50}$  or Inhibition concentration in 50% also was determined.

## RESULT

In present study total phenol was determined by Folin-Ciocalteu method and Gallic acid used as a standard and the flavonoid was performed by colorimetric method and Rutin was applied as a standard at concentration 1mg/ml (Figure 1, 2).

The *C. sativa* extract had the highest total phenols, flavonoids content and antioxidant activity by hydro- alcoholic extracts. *Petroselinum crispum* extract contain minimum Phenol and flavonoid concentration and antioxidant potential by Phosphate extract (Figure 1-3).

Iron chelating activity of *Coriander sativum* extract was reported more than *Petroselinum crispum* (Figure 4).

The maximum and minimum chelating activity was reported 90 % and 65 % respectively.

The maximum of  $IC_{50}$  was reported in aqueous extract of *Coriander sativum* and the minimum of  $IC_{50}$  was belonging to Phosphate *crispum* extract (Figure 5).

There was seen a correlation between iron chelating with phenol content ( $R^2 = 0.81$ ) and iron chelating with flavonoids concentration ( $R^2 = 0.62$ ) respectively. There was a relationship between antioxidant potential and iron chelating property ( $R^2 = 0.4$ ).

In present study iron chelating activity of aqueous and alcoholic extraction of plants were determined at 1, 2, 3, 5 and 10 mg/ml concentration and the most chelating activity was shown in concentration 3mg/ml. The chelating activity decreases when the concentration increases and it was minimum in 10mg/ml. It was shown that the iron chelating activity is not concentration dependent.

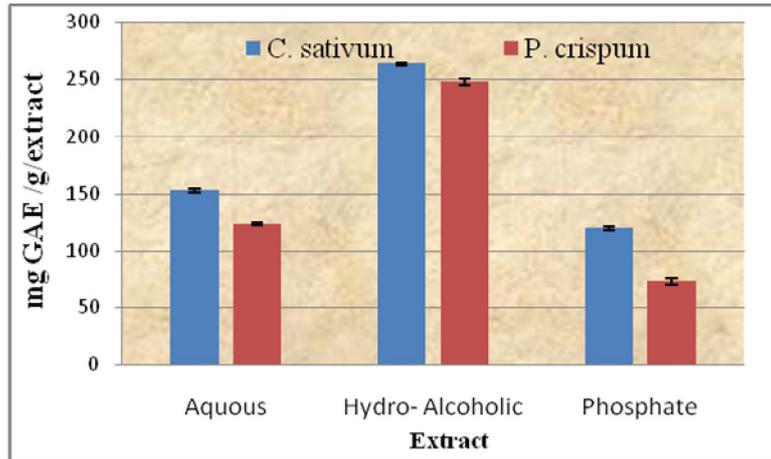


Figure 1. Total phenol contents of Coriander sativum and Petroselinum crispum in different extracts.

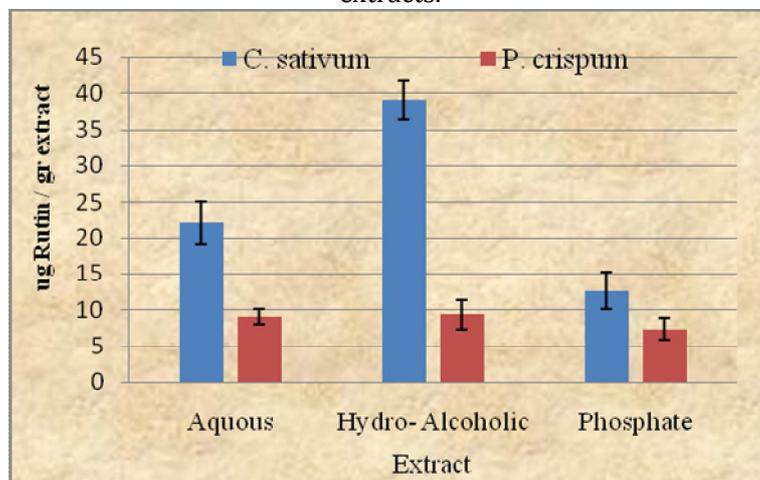


Figure 2. Total flavonoids contents of Coriander sativum and Petroselinum crispum in different extracts.

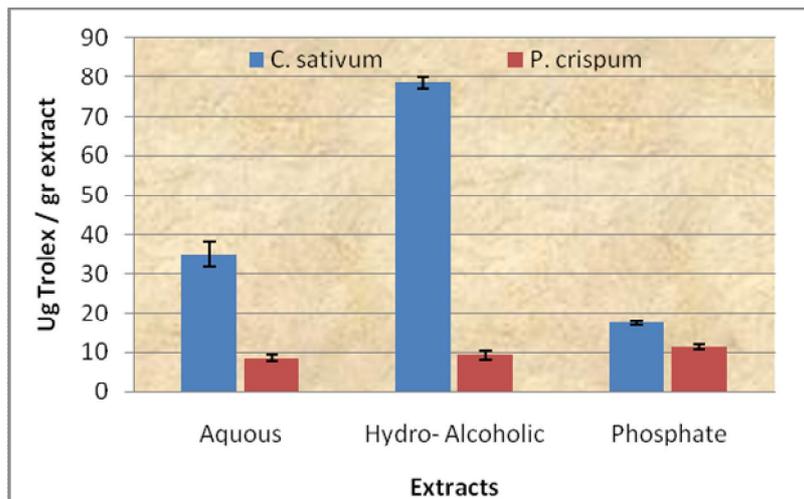


Figure 3 . Antioxidant activity by Diphenyl Pycryl Hydrazyl (DPPH ) in Coriander sativum and Petroselinum crispum in different extracts.

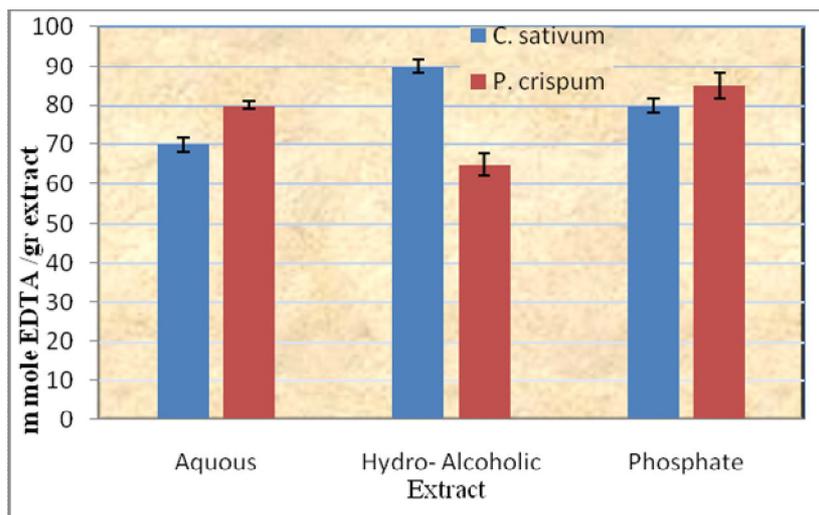


Figure 4. Iron chelating activity of Coriander sativum and Petroselinum crispum in different extracts.

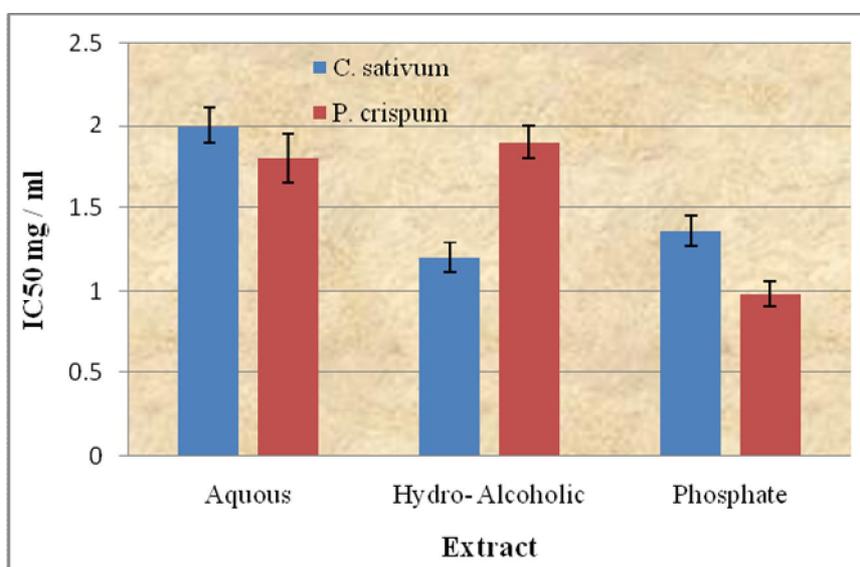


Figure 5. Iron chelating activity (IC<sub>50</sub>) in Coriander sativum and Petroselinum crispum in different extracts.

## DISCUSSION

The plants rich in polyphenol and flavonoid have considerable antioxidant activity and it may have metal chelating properties.

In the absence of chelating therapy, Cardiovascular, blood diseases such as thalassemia and thrombotic disease remains as a complex problem in patients with iron overloud.

In this study,the antioxidant properties and iron chelating was selected for screening of medicinal plants. In addition, total phenol, total flavnoid and DPPH (di phenyl Picryl hydrazyl ) was determined[11].

Recent study shows a strong correlation between total phenol( $R^2 =0.8$ ), flavonoid ( $R^2 =0.62$ ) with ironchelatingactivity , but the study which has been carried out by Ebrahimzadeh et al. indicated weak relation between phenol , flavonoid and iron chelating ( $R^2 =0.4$ ) . This low similarity may be due to the species and type of the plants, climate state and the type of fertilizer[11].

A research has been performed by Savaran et al. was emphasized on PH factor too much and it was considered as a significant factor in iron chelating activity. Isotonic PH was introduced as the best pH for iron complex and metal chelatingandthis close resemblance with this research. In recent work for the first time was focused at pH in plant extraction[12]

A research was performed by olatinri on chelating activity African walnut which not dose depended.

However, there was a high correlation between phenol and chelating activity in  $P < 0.01$ ,  $R^2 = 0.89$  and between iron chelating activity and antioxidant properties ( $R^2 = 0.68$ ,  $P < 0.001$ ) was reported.

In present study similar olabinri high correlation between phenol and chelating activity ( $R^2 = 0.81$ ,  $P < 0.05$ ) was evaluated. However weak correlation between antioxidant with iron chelating was found ( $R^2 = 0.25$ ,  $P < 0.05$ ). The observed difference may be due to the species plant and extraction method [13].

Iron toxicity is a key role of mortality in  $\beta$ -thalassemia major since, it made failure in function of basic organs including heart and brain. Thus excretion of iron is important for quality of life.

In present study for candidate a medicine with chelating capacity screening of iron chelating was performed.

In present paper Coriander sativa extracts was good chelator for iron removal at in vitro condition. This study was directed for introduce of plant extracts on iron toxicity.

The observed difference between results could be due to use of different standards in their protocols, different solvent systems and collecting of different species of plant samples.

## CONCLUSION

The Coriander sativa extract was reported with maximum phenol, flavonoid, antioxidant and chelating potential. Based on present in vitro result it is a suitable agent for removal of iron in thalassemic patient.

## REFERENCES

1. Manning, T. (2009). Iron chelators in Medicinal Application –Chemical Equilibrium Consideration in Pharmaceutical. J. current Medicinal Chemistry. 16():2416-2429.
2. Xiea, Z. (2008). Antioxidant activity of peptides isolated from alfalfa leaf protein hydroxylate. J. Food Chemistry. 111(2):370-376.
3. Brittenham, GM. (2011). Iron – chelating Therapy for Transfusional Iron Overload. J. The new england j. medicine .36:146 -156.
4. Olivieri, NF. (1997). Iron-chelating Therapy and the Treatment of Thalassemia. J. BLOOD JOURNAL. 89: 739-761.
5. Silvana, M L. (2003). Iron Overload in Hyper cholesterolemic Rats Affects Iron Homeostasis and Serum Lipids but Not Blood Pressure. J. American Society for Nutritional Sciences.
6. Milind, PA. (2005). Herbal medicines :Are they safe?. J. Natural product. 125(7):001-055.
7. Karim, A., Sohail MN., Munir, S., Sattar, S. [2011]. Pharmacology and phytochemistry of Pakistani herbs and herbal drugs used for treatment of diabetes. J. Pharmacol., 7: 419-439
8. Kosalec, I., Bakmaz, M., Pepeliniak, S., Vladimir-Knezevic, S. (2004). Quantitative analysis of the flavonoids in raw propolis from northern Croatia. Acta Pharm. 54: 65-72.
9. Mirzaei, N., Mirzaei, A. (2013). Antioxidant and antimutagenic property of Iranian oak and walnut plants. Int. J. Bio pharm and allied sci. 2(3): 620-629.
10. Dinis, TCP., Madeira VMC., Almeida, LM. (1994). Action of phenolic derivatives (acetaminophen, salicylate, and 5-aminosalicylate) as inhibitors of membrane lipid peroxidation and as peroxy radical scavengers. J. Archives of Biochemistry and Biophysics. 315:161-169.
11. Ebrahimzadeh, MA., Nabavi, SM. (2009). Correlation between the in vitro Iron chelating Activity and Poly Phenol and Flavonoid contents of some Medicinal Plants. J. Biological Science. 12(12):934-938.
12. Swaran, J.S. Flora. (2010). Chelation in Metal Intoxication. International Journal of Environmental Research and Public Health .7: 2745-2788.
13. Olabinri, BM. (2010). Evaluation of chelating ability of aqueous extract of Tetracarpidium conophorum (African walnut) in vitro. J. Applied Research in Natural Products .3 (3): 13-18.

## HOW TO CITE THIS ARTICLE

Ali M. and Raheleh K. Antioxidant and Iron Chelating Activity of *Coriander sativum* and *Petroselinum crispum*. Bull. Env. Pharmacol. Life Sci., Vol 2 (7) June 2013: 27-31