ORIGINAL ARTICLE

Antioxidant and Iron Chelating Activity of Coriander sativum and Petroselinum crispum

1Ali Mirzaei, 2Raheleh Khatami *
1Medicinal plant Research Centre, Yasuj Medical Sciences University, Yasuj, Iran
2Student 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 e xtract had the highest total phenols, flavonoids content and antioxidant activity by hydro-alcoholic extracts. Petroselium 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 Petroselium crispum. A significant correlation between iron chelating with phenols and flavonoids and a weak relation with antioxidant potential (R² = 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,flavonoid contents

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 cell particularly neutrophil and infection were reported in literatures [3]. Deferasirox was certified and confirmed in 2006 by the European Union and is used widely for thetreatment of iron toxicity in thalassemia patients by oral route. High price of this drugs is a problemin therapeutic practice.it is slowly cleared through hepatobiliary system [3]. Generally, chelating agents that used recently for treat of thalassemia have 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 Apiaccae 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 Apiaccae 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 was 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-Ciocalteau 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 Dipheny-picrylhydrazyl (DPPH)**: The antioxidant activity of extract determined by Percent of inhibition as follow: % Inhibition = [(A0 - A1)/A0] ×100

A0 was the absorbance of control and A1 was the absorbance of the extracts [9].

**Metal chelating activity**: The chelation of Fe²⁺ ions by extracts was determined using Dinis method [10]. IC₅₀ or Inhibition concentration in 50% also was determined.

**RESULT**

In present study total phenol was determined by Folin-Ciocalteau 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 ).

Ironchelating 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 IC₅₀ was reported in aqueous extract of *Coriander sativum* and the minimum of IC₅₀ was belonging to Phosphate extract (Figure 5).

There was seen a correlation between iron chelating with phenol content (R² = 0.81) and iron chelating with flavonoids concentration (R² = 0.62) respectively. There was a relationship between antioxidant potential and iron chelating property (R² = 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\textsubscript{50}) 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 overload.

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

Recent study shows a strong correlation between total phenol (R\textsuperscript{2} =0.8), flavonoid (R\textsuperscript{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\textsuperscript{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 chelating and this is 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 olabinri on chelating activity African walnut which not dose depended.
However, there was a high correlation between phenol and chelating activity in P<0.01, R² =0.89 and between iron chelating activity and antioxidant properties (R² = 0.68, P< 0.001) was reported. In present study similar Olabinri high correlation between phenol and chelating activity (R² = 0.81, P<0.05) was evaluated. However weak correlation between antioxidant with iron chelating was found (R² =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 β-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


HOW TO CITE THIS ARTICLE